Dedication


To all our women's health nurse practitioner and midwifery colleagues who provide care for women and their families, thank you for the work that you do.

- Beth and Jamille

This book would not have been possible without my husband, who is always ready to listen and provide love and support. Of course, to my children, Leo, Leilani, and Leah, you define love for me in many ways. You make me so proud, especially when you use correct anatomical terms when referring to body parts!

Thank you, Beth, for the wonderful opportunity to be your writing partner. I would have never dreamed that this would be a possibility when I studied for my own boards using your book many years ago. Thank you for your friendship and mentorship.

- Jamille

Thank you to my husband Jeff for his loving support and understanding throughout the many hours of work done to complete this book. Jamille, it has been a delight to work with you as coeditor, we make a good team.

- Beth
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A comprehensive review is essential for those preparing to take the midwifery (American Midwifery Certification Board [AMBC]) examination or the women’s health nurse practitioner certification (National Certification Corporation [NCC]) examination. *Midwifery & Women’s Health Nurse Practitioner Certification Review Guide, Fourth Edition* was developed for both of these nursing specialties because of the many commonalities they share in providing health care for women throughout the life span. Experts in the field of women’s health combined their expertise to provide a valuable resource that will assist women’s health nurse practitioners and midwives in their pursuit of success on their respective certification examinations. Multiple resources have been utilized to ensure the integrity of this text so that it is representative of the content that may be encountered by both specialties during the examination process.

Many nurses preparing for certification examinations find that reviewing an extensive body of scientific knowledge requires a very difficult search of many sources that must be synthesized to provide a review base for the examination. The purpose of this review guide is to provide a succinct yet comprehensive review of the core material.

This guide is organized to provide the reader with test-taking and study strategies first (Chapter 1, “Strategies for Studying and Test Taking”). This is a prerequisite for success in the certification examination arena. The major content is then provided in Chapter 2, “General Health Assessment and Health Promotion,” Chapter 3, “Principles of Pharmacology,” Chapter 4, “Normal Gynecology and Well-Woman Care: Reproductive Years,” Chapter 5, “Well-Woman Care: Menopause and Beyond,” Chapter 6, “Gynecological Disorders,” Chapter 7, “Prenatal Care and Fetal Assessment,” Chapter 8, “Intrapartum and Postpartum,” Chapter 9, “Midwifery Care of the Newborn,” Chapter 10, “Common Health Problems in Primary Care,” and Chapter 11, “Professional Issues.” Women’s health nurse practitioners and midwives reviewed chapters in the previous edition to provide feedback and recommendations. New and revised content reflects this review.

Test questions are included at the end of each chapter. These questions are intended to provide the reader with test-taking practice and are representative of those found on the certification examinations. The correct answers with rationales are also provided. A bibliography is included at the end of each chapter for those who want to review specific content in more detail.

The coeditors, Beth M. Kelsey and Jamille Nagtalon-Ramos, are board-certified women’s health nurse practitioners. Kimberly K. Trout, CNM, PhD, APRN, authored Chapter 9, “Midwifery Care of the Newborn” and coauthored Chapter 8, “Intrapartum and Postpartum” and Chapter 11, “Professional Issues.” Dr. Trout, a board-certified midwife, is Assistant Professor of Women’s Health at the University of Pennsylvania School of Nursing, Philadelphia, Pennsylvania.

It is assumed that readers of this review guide have completed a course of study in either a women’s health nurse practitioner and/or midwifery program. It is not intended to be a basic learning tool. Readers should be aware that practice guidelines; diagnostic criteria; and tests, treatment, and management recommendations/protocols are always evolving. The information provided in this review guide was current at the time the guide went to print.

Jones & Bartlett Learning and the coeditors would like to thank the following individuals for their contributions to the first two editions of this review book:

- Penelope M. Borsage, MSN, WHNP
- Patricia Burkhardt, PhD, CNM
- Mary C. Knutson, MN, WHNP
- Anthony A. Lathrop, PhD, CNM
- Anne A. Moore, DNP, WHNP/ANP, FAANP
- Sandra K. Pfantz, PhD, ANP
- Susan P. Shannon, MS, CNM
### AMCB Exam Blueprint

<table>
<thead>
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<th>Category</th>
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<tr>
<td>Intrapartum</td>
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<tr>
<td>Postpartum</td>
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<tr>
<td>Newborn</td>
<td>7–16%</td>
</tr>
<tr>
<td>Well Woman/Gyn</td>
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<td>Women’s Health/Primary care</td>
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### NCC Exam Blueprint

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<tr>
<td>Professional Issues</td>
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</tr>
</tbody>
</table>

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Philadelphia University

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Emory University
I worked my way through *Midwifery & Women’s Health Nurse Practitioner Certification Review Guide, Fourth Edition* during my program, and when it came time to take my boards, I reviewed the sections and questions, completed the online question bank, and felt prepared. When I did not understand a question, I would return to the review book. I used no outside study materials and felt pleasantly surprised by how prepared I felt. This book provided a systematic approach to the daunting task of multiple topics. It helped me hone in on what was important and not get lost in a study abyss. Overall, I would recommend this book to anyone preparing for the WHNP/Midwifery boards. My entire cohort used this book, and we all passed the boards on our first try!

—Alexis P., WHNP

This book was my primary source when studying for the AMCB exam. The content accurately reflects the topics found on the certification exam. If you are looking for a study guide that has concise information and great questions...this is the book for you. Well worth the money!

—Tahara P., CNM

This review guide provided a condensed yet comprehensive review of exam topics, and made studying for my WHNP boards easy and efficient. The online assessment allowed me to take numerous practice tests that identified areas to focus my studying, and prepared me for test day.

—Liz F., WHNP

To be honest, aside from *Contraceptive Technology*, it was the only other reference I used to study for the Boards. I must’ve combed through it cover to cover, three to four times in preparation. I also used the online access code that came with it as well to get a sense of what the question structure/set up would be like when I actually sat down to take the exam. It provided a good foundation/base content and also covered a wide range of potential topics that could be tested. I believe it’s also what got me through the Primary Care portion of the exam with a passing score.

—Gena W.
If you are reading this chapter, you are likely concerned about how best to prepare to take your certification examination. Understanding your current study and test-taking strategies is an important step in deciding where you may benefit from making some changes or additions to these strategies. Studying for a certification examination is somewhat different from studying for a single test in a course you are taking. Test-taking skills and strategies are very important to success. Preparing yourself to be a successful test taker is as important as studying for the test. The primary goal of this chapter is to assist potential test takers in knowing how to study for and take a certification test. Please use the described strategies in a way that meets your individualized study and test-taking needs.

Strategy 1: Know Yourself

Over years of test taking, each of us has developed certain study and testing behaviors, some of which are helpful and others of which present obstacles to success. Take control of your preparation for your certification exam by identifying study and test-taking behaviors you need to change, recognizing those behaviors you have in place that are beneficial, and developing skills to improve your study and test-taking abilities.

Strategy 2: Know the Content to Be Studied

The National Certification Corporation (NCC) is the certifying body for women’s health nurse practitioners (WHNPs), and the American Midwifery Certification Board (AMCB) is the certifying body for nurse–midwives and midwives. Both the NCC and AMCB provide content outlines as well as information on examination content development on their websites. The website for NCC is http://www.nccwebsite.org, and the website for AMCB is http://www.amcbmidwife.org.

The content of these certification examinations and the percentages for each area of content are based on periodic job analysis surveys of practitioners representing the WHNP focus for NCC or the nurse–midwife and midwife focus for AMCB. Both NCC and AMCB use a rigorous process to ensure that test questions are reflective of current evidence-based practice and that the questions are constructed using psychometric test construction principles.

NCC offers lists of study resources that include textbooks and other widely used reference books. These lists are not meant to be inclusive but to provide you with examples of resources you might consider, along with the textbooks you have from your courses. Although you want a variety of resources, do not overload yourself with too many books to review because this will be very time consuming, overwhelming, anxiety provoking, and likely redundant in information that you need to know for the examination.

Strategy 3: Know Your Strengths and Weaknesses

Read through the exam content outline provided by the certification examination body. Conduct a content self-assessment. Rate yourself on each content area. Use a simple rating scale such as the following:

1 = requires no review
2 = requires minimal review
3 = requires intensive review
4 = start from the beginning

Table 1-1 provides a sample exam content assessment (not all content included). Be honest with your self-assessment. It is far better to recognize
your content weaknesses when you can study and remedy them rather than thinking during the exam how you wished you had studied more. And also be honest with your content strengths: If you know the material, do not waste time studying it.

Strategy 4: Develop a Study Plan

Use the exam content outline and your content self-assessment to develop a study plan. This should require no more than 60 minutes and is well worth the time, with the potential for reducing study stress and enhancing exam success.

The content outlines provided by NCC and AMBC include percentages for the major topic areas that approximate the number of questions that will be devoted to that content. These percentages can change from year to year. Develop your study plan to coordinate with the following:

- Examination content outline
- Percentages for content areas
- Content self-assessment of strengths and weaknesses
- Time available for study before you plan to take the exam

Prioritize your study needs, and start with weak areas first. Avoid the temptation to start with what you know best. Allow for a general review at the end of the study plan. There is no single correct answer to the question, How much time should I spend studying? Spend as much time as you need, start the process early, know your strengths and weaknesses, plan, monitor your progress, and be flexible (Sefcik, Bice, & Prerost, 2013).

Table 1-2 illustrates a partial study plan developed on the basis of the exam content self-assessment in Table 1-1.

Strategy 5: Get Down to the Business of Studying

The quality of your studying is as important as the quantity of your studying. This is directly influenced by organization and concentration.

If you expend effort on both aspects of exam preparation, you can increase your examination success.

Preparation for Studying: Getting Organized

Study habits are developed early in our educational experiences. Some of our habits enhance learning; others do not. To increase study effectiveness, organization of study materials and time is essential. Organization decreases frustration, allows for easy resumption of study, and increases concentrated study time.

Create Your Own Study Space

Select a study area that is yours alone, free from distractions, comfortable, and well lit. The ventilation and room temperature should be comfortable because a cold room makes it difficult to concentrate and a warm room may make you sleepy. All your study materials should be left in your study space. The basic premise of a study space is that it facilitates a mind-set that you are there to study. When you interrupt study, it is best to leave your materials just as they are. Do not close books or put away notes because you will just have to relocate them, wasting your study time, when you resume study.

Identify Your Peak Study Times and Maximize Them

Study in short bursts. Each of us has our own biologic clock that dictates when we are at our peak during the day. If you are a morning person, you are generally active and alert early in the day, slowing down and becoming drowsy by evening. If you are an evening person, you do not completely wake up until late morning and hit your peak in the afternoon and evening. Each person generally has several peaks during the day. It is best to study during those times when your alertness is at its peak.

Spread Out Study Time and Give Your Brain Breaks

Studying is more effective when spread out over a longer period of time. This is a concept called distributed effort or spaced studying (Medina, 2008) and is the opposite of cramming. In addition to spreading study time over

### Table 1-2 Sample Study Plan: Gynecologic Disorders Content

<table>
<thead>
<tr>
<th>Study Day</th>
<th>Date</th>
<th>Content</th>
<th>Resources</th>
<th>Time</th>
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<tbody>
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<td>Chapter 3 Textbook A</td>
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<td>Class notes</td>
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<tr>
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<td>Chapter 5 Textbook A</td>
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<td>Class notes</td>
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</table>
several days or weeks, you also need to give your brain rests during any one study period. The best approach to breaks is to plan them and give yourself a conscious break. This approach eliminates the daydreaming or wandering-thought approach to breaks that many of us use. It is better to get up, leave the study area, and do something non-study-related for longer breaks. For shorter breaks of 5 minutes or so, leave your desk, gaze out the window, or do some stretching exercises. When your brain says to give it a rest, accommodate it! You will learn more with less stress.

Focus on Major Concepts and Facts
Study the correct content. It is easy to become bogged down in the detail of the content you are studying. However, it is best to focus on the major concepts or the state-of-the-art content. Leave the details, the suppositions, and the experience at the door of your study area. Concentrate on the major textbook facts and concepts that revolve around the subject matter being tested.

Use Your Study Plan Wisely
Your study plan is meant to be a guide, not a rigid schedule. You should take your time with studying. Do not rush through the content just to remain on schedule. Occasionally, study plans need revision. If you take more or less time than planned, readjust the plan for the time gained or lost. The plan can guide you, but you must go at your own pace.

Study Actively
Active study techniques have been shown to strengthen neural connections and improve ability to remember materials being studied. Three techniques for active study are recitation, visualization, and association (Hopper, 2013).
- Recitation: When you recite something in your own words, you pay more attention. You also get immediate feedback. If you are able to explain something in your own words out loud, you understand it. Also when you hear something, you have used a different part of your brain than when you read it. Having a study partner or group can facilitate the use of recitation if you ask each other questions and answer out loud.
- Visualization: Try to visualize the concepts you are studying in some way, such as by imagining a patient, either someone you have met or a fictional person, with a specific condition. Use illustration and pictures from textbooks as you study. Take notes or make flashcards to promote visualization. Convert connected information into a visual graph (pie, chart, concept map).
- Association: You can remember information more efficiently if you link new information to something you already know. Ask yourself: If I were to put this in a computer (brain) file, does a similar or related file already exist so that I don’t have to create a new one?

Use your individual study quirks. Some people stand, others walk around, and some play background music. Whatever helps you to concentrate and study better is what you should use.

Use Study Aids
Although there is no substitute for individual studying, several resources, if available, are useful in facilitating learning. One study aid already discussed is the detailed content outlines provided by NCC and AMCB. Review courses and review books such as this one can provide an effective means for organizing or summarizing your individual study. They generally provide the content parameters, the major concepts of the content that you need to know, and an opportunity to clarify not-well-understood content, as well as a review of known material. Question-and-answer resources provide practice in test taking and are most helpful when answer rationales are included to reinforce the correct information. Study groups are an excellent resource for summarizing and refining content. They provide an opportunity for thinking through your knowledge base, with the advantage of hearing another person’s point of view. Each of these study aids increases understanding of content and, when used correctly, increases effectiveness of knowledge application.

Know When to Quit
It is best to stop studying when your concentration ebbs. It is unproductive and frustrating to force yourself to study. It is far better to rest or unwind, and then resume at a later point in the day. Avoid studying outside your morning or afternoon concentration peaks and focus your study energy on your right time of day or evening.

Strategy 6: Become Testwise

Purpose of a Test Question
Test questions are developed to examine different cognitive domains: knowledge, comprehension, application, analysis, synthesis, and evaluation. You will most likely see questions in the knowledge, comprehension, application, and analysis domains on the certification exam. A knowledge question requires the test taker to recall a fact; comprehension questions require the test taker to understand the meaning of the fact; application questions require the test taker to be able to apply knowledge in a concrete situation; and analysis questions require the test taker to be able to break down information, identifying parts, relationships, and organization (Wittman-Price, Godshall, & Wilson, 2013).

When taking a test, you want to be aware of whether you are being asked a fact or to use that fact. An example of a knowledge question is as follows:

Which of the following statements about herpes genitalis is true?

A. Suppressive therapy does not reduce viral shedding.
B. Systemic symptoms are uncommon during recurrences.
C. Topical acyclovir is as effective as oral acyclovir for recurrences.
D. Transmission of the virus is unlikely to occur during the prodromal phase.

To answer this question correctly, you must retrieve memorized facts. Understanding the fact, knowing why it is important, and analyzing what should be done with the fact are not needed.

An example of a question that tests comprehension is as follows:

A 24-year-old female presents with complaint of itching and pain in her genital area that started 2 days ago. She also complains of pain with urination. Physical examination reveals bilateral inguinal lymphadenopathy, vulvar edema with multiple vesicles and ulcerated lesions, and a large amount of watery vaginal discharge. The most likely diagnosis is:

A. Genital herpes
B. Genital warts
C. Syphilis
D. Trichomoniasis

To answer this question correctly, you must retrieve several facts about the signs and symptoms of herpes genitalis and understand that, put together, the findings are likely indicative of herpes rather than some other diagnosis. An example of an application question is as follows:

A 24-year-old female presents with a history of herpes diagnosis 6 months ago and asks if there is anything she can do to deal with recurrent outbreaks.
She has had two recurrences since her initial occurrence. Appropriate information for this patient would include which of the following?

A. Comfort measures and topical acyclovir are the best approach to managing her recurrences.
B. She can be assured that she is unlikely to have more than one or two recurrences a year.
C. She can consider episodic therapy for recurrences or suppressive therapy with acyclovir.
D. Suppressive medication is not recommended for someone who has less than four recurrences a year.

To answer this question correctly, you must know and comprehend facts about herpes recurrences and suppression, and apply this information to an individual patient situation. You must think through each answer and decide its relevance and importance to the situation in question.

An example of an analysis question is as follows:

A 24-year-old female tells you her sex partner for the past year has a history of herpes genitalis. You order a herpes type-specific serologic test. The results show HSV-1 positive and HSV-2 negative. The accurate interpretation of these results is that she:

A. has acquired a herpes infection from her sex partner.
B. has not acquired a herpes infection from her sex partner.
C. does not have the herpes virus type that causes genital herpes infection.
D. may or may not have acquired herpes infection from her partner.

To answer this question correctly, you must be able to break down the information about the type-specific serologic test results and identify the parts and relationships with the information you have about the patient and her partner.

**Question Format**

Most standardized tests such as those used for nursing licensure and certification use multiple-choice questions (MCQs) composed of three or four answer options for which you are required to select the one best answer. Both NCC and AMCB certification exams use MCQs with either three or four answer options (American Midwifery Certification Board, 2016; National Certification Corporation, 2016).

Successful test taking depends not only on content knowledge but also on test-taking skill. If you are unable to impart your knowledge through the vehicle used for its conveyance, that is, the MCQ, your test-taking success is in jeopardy.

**Components of MCQs**

MCQs include two basic components: a stem and a set of answer options. The stem presents information needed by the test taker to select an answer. The stem may be short, consisting of just a phrase or a sentence or two, or it can be a paragraph in length. When the stem is more than a phrase or sentence in length, it usually includes a separate interrogatory question or statement that poses the question to be answered. The interrogatory question or statement helps to direct the test taker's thinking.

The answer options are three or four possible responses to the question. The correct option is called the **keyed response**, and all other options are called **distractors** (Sefcik et al., 2013). The keyed response may be the only correct answer or it may be the best answer. Higher-level questions usually have a best answer along with distractor options that may be partially correct or that may not address all of the data presented in the question stem.

Knowing the components of a test question helps you sift through the information presented and focus on the question's intent. Always focus on the information in the stem and, more specifically, what the interrogatory question or statement is asking. Avoid reading elements into the question that aren't specifically included in the stem and options (see Table 1-3).

**Practice, Practice, Practice**

Taking practice tests can improve performance. Although they can assist in evaluation of your knowledge, their primary benefit is to assist you with test-taking skills. You should use them to evaluate your thinking process; your ability to read, understand, and interpret questions; and your skills in completing the mechanics of the test.

Exam resources, including sample questions for the NCC and the AMCB, are available in the examination content information. The questions at the end of each chapter of this book and the separate test questions available online provide you with more than 900 MCQs. The answers to the questions are provided along with rationales.

**Strategy 7: Apply Basic Rules of Standardized Test Taking**

**Read All Directions Carefully**

Be sure that you have completed all information needed to register for the exam and that you have all required documents and personal identification. Know what you are permitted to have in the testing area and what is not permitted. It is helpful to list everything you need for admission to the examination as well as permitted items you want to have with you during the exam.

**The Night Before the Test**

Follow your regular routine the night before a test. Eat familiar foods. Avoid the temptation to cram all night. Go to bed at your regular time.

**The Day of the Test**

Be prepared for exam day. It is important to familiarize yourself with the test site, the building, the parking, and travel route prior to the exam day. If you must travel, arrive early to allow time for this familiarization. On exam day, allow yourself plenty of time to arrive at the site; plan to get there 30 minutes before your scheduled exam time. Wear comfortable
clothes and have a good breakfast that morning. Know whether you will be able to have food or drink in the exam area or will be able to have them available for a short break.

Know what to do if you experience any electronic or other difficulties during the examination. In addition to addressing the issue at the test site, you should also notify the certifying board.

Use Your Time Wisely and Effectively
Most standardized, computer-delivered exams have a digital clock on the computer indicating how much time you have remaining. This feature may be turned off and on during the exam if you find it creates anxiety for you. Know the number of questions on the exam and the total amount of time you have to complete the exam. For example, if there are 175 questions and you have 4 hours to complete the exam, you have approximately 1 minute per question. If there are 175 questions and you have 4 hours to complete the exam, you have approximately 1½ minutes per question. Remember that a good number of questions will likely take you less than 1 minute to answer. Skip or make an educated guess on difficult questions, and mark and return to them later.

Identify key words in the stem before looking at the options for each question. Confine your thinking to the information provided.

Read and consider all options. Be systematic and use problem-solving techniques. Relate options to the question and balance them against each other. Eliminate answers you know are wrong and focus on the remaining most likely correct responses.

Answer all the questions on the exam. Currently, the NCC and AMCB certification examination scores are based only on the total number of correct answers selected. This means that you are not further penalized for an incorrect answer. So answer all the test questions, even if you are only guessing (American Midwifery Certification Board, 2016; National Certification Corporation, 2016).

Go back to questions you were not able to answer on the first pass through the test. You may have gained information from subsequent questions that is helpful in answering previous questions, or you may be less anxious and more objective by the end of the test.

However, avoid second-guessing answer choices you have already made. Your first response is likely the best response. If you tend to second-guess your responses, review only those questions that you could not answer on the first pass through the exam. Computer-based exams allow you to mark questions that you may want to address later in the exam.

Do not change an answer without a good reason. Good reasons might be realizing you misread the question the first time or running across information in later questions that either jogs your memory or gives you a better idea of what the correct answer might be (Lamonte, 2007; Sefcik et al., 2013).

Take Control
By identifying your goal, deciding how to accomplish it, and developing a plan for achieving it, you take control. Do not leave your success to chance; control it through action and attitude.

Manage Anxiety
A little stress or anxiety can be productive because it can serve as a motivator to take a test seriously and to prepare for it adequately. Too much anxiety can have negative consequences that include not using study time productively; misreading questions; changing answers from right to wrong; and developing physical symptoms such as diarrhea, nausea, and palpitations.

Active anxiety-control strategies include relaxation techniques (i.e., guided imagery, meditation), stress management, attention to wellness behaviors (i.e., healthy eating, adequate sleep, regular exercise), combining individual review with review in small study groups for social support and increased confidence, completing practice questions, preparing well in advance, and taking the time to review all the processes on examination day (Lamonte, 2007; McDowell, 2008).

For persons with severe test anxiety, interventions such as cognitive therapy, systematic desensitization, study skills counseling, and biofeedback have all been used with some success. Techniques derived from these approaches can influence the results achieved by changing attitudes and approaches to test taking and thereby reducing anxiety.

Persevere, Persevere, Persevere!
Endurance must underlie all your efforts. Call forth those reserve energies when you have had all you think you can take. Rely on yourself and your support systems to help you maintain a sense of direction and keep your goal in the forefront.

Reward Yourself
Reward yourself during your exam preparation and once the exam has been completed. You alone hold the key to success; use what you have wisely.

Know How You Will Manage Failure
An initial failure on the certification exam is a possibility. Keep in mind that passing or not passing the test is not a measure of an individual’s self-worth or a reflection of an individual’s true value. An initial failure does not mean that the individual will not be an excellent nurse practitioner or midwife. If you do not pass the test on the first try, do not dwell on the failure. Recognize what you need to change in your preparation and move forward. Failure is a time to begin again; use it as a motivator to do better.

Summary
This chapter provided concepts, strategies, and techniques for improving study and test-taking skills. Your first task in improvement is to know yourself: how you study and how you take a test. You should use your strengths and remedy the weaknesses. Next, you need to organize your study time, and concentrate on using your strengths and new and improved skills to be successful. Create a study space, develop a plan of action, and then implement that plan during your periods of peak concentration. Before taking the exam, be sure you understand the components of a test question, can identify key words and phrases, and practice. Apply the test-taking rules during the exam process.

Finally, believe in yourself, your knowledge, and your talent. Believing you can accomplish your goal facilitates the fact that you will.
Bibliography


Health History

- Purpose and correlation to physical examination
  1. Begins the client–clinician relationship
  2. Identifies the client’s main concerns
  3. Provides information for risk assessment and health promotion
  4. Provides focus for physical examination and diagnostic/screening tests
  5. Provides information about cultural variations in health beliefs and practices

- Components of the health history
  1. Reason for visit/chief complaint—brief statement in client’s own words of reason for seeking health care
  2. Presenting problem/illness—chronological account of problem(s) for which client is seeking care
    a. Description of principal symptoms should include OLD-CARTS mnemonic:
       (1) Onset
       (2) Location
       (3) Duration
       (4) Characteristics
       (5) Aggravating/Associated factors
       (6) Relieving factors
       (7) Temporal factors
       (8) Severity
    b. Include pertinent negatives in symptom descriptions; when a symptom suggests that an abnormality may exist or develop in that area, include documentation of absence of symptoms that may help eliminate some of the possibilities
    c. Describe impact of illness/problem on client’s usual lifestyle
    d. Summarize current health status and health promotion/disease prevention needs if client has no presenting problem
  3. Past health history
    a. General state of health as client perceives it
    b. Childhood illnesses
    c. Major adult illnesses
    d. Psychiatric illnesses
    e. Accidents/injuries
    f. Surgeries/other hospitalizations
    g. Blood transfusions—dates and number of units

- Current health status
  a. Current medications—prescription, over the counter, herbal
  b. Allergies—name of allergen, type of reaction
  c. Tobacco, alcohol, illicit drugs—type, amount, frequency
  d. Nutrition—24-hour diet recall, recent weight changes, eating disorders, special diet
  e. Screening tests—dates and results
  f. Immunizations—dates
  g. Sleep patterns
  h. Exercise/leisure activities
  i. Environmental hazards
  j. Use of safety measures—safety belts, smoke detectors
  k. Disabilities—functional assessment if indicated

- Family health history—provides information about possible genetic, familial, and environmental associations with client’s health
  a. Age and health or age and cause of death of immediate family members—parents, siblings, children, spouse/significant other
  b. Specific conditions to ask about—heart disease, hypertension, stroke, diabetes, cancer, epilepsy, kidney disease, thyroid disease, asthma, arthritis, blood diseases, tuberculosis, alcoholism, allergies, congenital anomalies, mental illness, genetic disorders
  c. Indicate if client is adopted and/or does not know family health history

- Psychosocial/cultural health history
  a. Living situation
  b. Support system
  c. Stressors (including violence)
  d. Typical day
  e. Religious/spiritual beliefs and practices
  f. Outlook on present and future
g. Special issues to address with adolescent clients include

**HEADSS:** Home, Education, Activities, Drugs, Sex, Suicide

h. Cultural assessment considerations

1. Cultural/ethnic identification—place of birth, length of time in country
2. Communication—language spoken, use of nonverbal communication, use of silence
3. Space—degree of comfort with distance between self and others, degree of comfort with touching by others
4. Social organization—family structure and roles, influence of religion/spirituality
5. Time—past-, present-, or future-oriented; view of time—clock-oriented or social-oriented
6. Environmental control—internal or external locus of control, belief in supernatural forces
7. Use of culturally based healing practices or remedies

7. Obstetric history—may include in separate section, past health history, or review of systems—includes all pregnancies regardless of outcome

a. Gravidity—total number of pregnancies including a current pregnancy
b. Parity—total number of pregnancies reaching 20 weeks or greater gestation
   1. Include term, preterm, and stillbirth deliveries
   2. Include length of each pregnancy; type of delivery; weight and sex of infant; length of labor; complications during prenatal, intrapartum, or postpartum periods; infant complications; cause of stillbirth if known

c. Abortions—spontaneous and induced
d. GTPAL—Gravida, Term, Preterm, Abortion, Living children is a commonly used method of obstetric history notation
e. Any infertility evaluation and treatment

8. Menstrual history—may include in separate section or in review of systems

a. Age at menarche, regularity, frequency, duration, and amount of bleeding
b. Date of last normal menstrual period
c. Use of pads, tampons, douching
d. Abnormal uterine bleeding
e. Premenstrual symptoms
f. Dysmenorrhea
g. Perimenopausal symptoms
h. Age at menopause, use of hormone therapy, postmenopausal bleeding

9. Sexual history/contraceptive use—may include in separate section, under current health status, or in review of systems

a. Age at first sexual intercourse—consensual/nonconsensual
b. History of sexual abuse or sexual assault
c. Sexual orientation/gender identity
d. Current sexual relationship(s)
   1. Frequency of sexual intercourse
   2. Satisfaction or concerns with sexual relationship(s)
   3. Dyspareunia, orgasmic or libido problems
e. Sexually transmitted infection (STI)/human immunodeficiency virus (HIV) infection risk assessment

1. Total number of sexual partners and number in past 3 months
2. Types of sexual contact—vaginal, oral, and/or anal
3. Use of condoms or other barrier methods
4. Previous history of STIs
5. Use of injection drugs or sex with partner who has used injection drugs
6. Sex while under the influence of alcohol and/or drugs
7. Previous testing for HIV

f. Current and future desire for pregnancy
g. Contraceptive use

1. Establish if pregnancy is not a concern—hysterectomy, sterilization, not sexually active, only sexually active with females, menopausal
2. Current method, length of time used, satisfaction, problems or concerns
3. Previous methods used, when, length of time used, satisfaction, problems or concerns, reason for discontinuation

h. Inclusive language—partner or spouse instead of boyfriend or husband; client-preferred pronouns if transgender, gender nonconforming, or gender queer; options on forms regarding gender to include transgender and other with option to write in gender identity

10. Review of systems—used to assess common symptoms for each major body system to avoid missing any potential or existing problems; special focus for women's reproductive health includes:

a. Endocrine—menses, breasts, pregnancy, thyroid, menopause
b. Genitourinary
   1. In utero exposure to diethylstilbestrol (DES) if born before 1971
   2. History or symptoms of uterine or ovarian problems
   3. History or symptoms of STI or pelvic infection
   4. History or symptoms of vaginal infections
   5. History of abnormal Pap tests—date, abnormality, treatment
   6. History or symptoms of urinary tract infection
   7. Symptoms of urinary incontinence

11. Concluding question—Is there anything else I need to know about your health in order to provide you with the best health care?

- Risk factor identification

1. Consider prevalence (existing level of disease) and incidence (rate of new disease) in general population and in your client population

2. Determine risks specific to client related to the following:
   a. Gender
   b. Age
   c. Ethnic or racial background
   d. Family history
   e. Environmental exposures
   f. Military service—currently serving or veteran, deployment locations, role, related physical/mental health issues
   g. Lifestyle
   h. Geographic area
   i. Inadequate preventive health care

- Problem-oriented medical record—organized sequence of recording information using SOAP format
1. SOAP format
   a. S—subjective information obtained during history
   b. O—objective information obtained through physical examination and laboratory/diagnostic test results
   c. A—assessment of objective and subjective data to determine a diagnosis with rationale or a prioritized differential diagnosis
   d. P—plan to include diagnostic tests, therapeutic treatment regimen, client education, referrals, and date for reevaluation

2. Problem list—list each identified existing or potential problem and indicate both onset and a resolution date

3. Progress notes—use SOAP format for information documented at follow-up visits

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**Physical Examination (General Screening Examination)**

- Purpose and correlation to health history
  1. Findings may indicate need for further health history information
  2. Takes into account normal physical variations of different age and racial/ethnic groups

- Techniques of examination
  1. Inspection—observation using sight and smell
     a. Takes place throughout the history and physical examination
     b. Includes general survey and body system–specific observations
  2. Auscultation—use of hearing usually with stethoscope to listen to sounds produced by the body
     a. Diaphragm best for high-pitched sounds (e.g., S1, S2 heart sounds)
     b. Bell best for low-pitched sounds (e.g., large blood vessels)
  3. Percussion—use of light, brisk tapping on body surfaces to produce vibrations in relation to density of underlying tissue and/or to elicit tenderness
     a. Provides information about size, shape, location, and density of underlying organs or tissue
     b. Percussion sounds are distinguished by intensity (soft–loud), pitch (high–low), and quality
     c. Tympany—loud, high-pitched, drum-like sound (e.g., gastric bubble, gas-filled bowel)
     d. Hyper-resonance—very loud, low-pitched, boom-like sound (e.g., lungs with emphysema)
     e. Resonance—loud, low-pitched, hollow sound (e.g., healthy lungs)
     f. Dull—soft to moderate, moderate-pitched, thud-like sound (e.g., liver, heart)
     g. Flat—soft, high-pitched sound, very dull (e.g., muscle, bone)
  4. Palpation—use of hands and fingers to gather information about body tissues and organs through touch
     a. Finger pads, palmar surface of fingers, ulnar surface of fingers/hands, and dorsal surface of hands are used
     b. Light palpation—about 1 cm in depth, used to identify muscular resistance, areas of tenderness, and large masses or areas of distention
     c. Deep palpation—about 4 cm in depth, used to delineate organs and to identify less obvious masses

- Standard precautions—minimum infection prevention practices that apply to all patient care, regardless of suspected or confirmed infection status (Centers for Disease Control and Prevention [CDC], 2011)
  1. Precautions based on principle that all blood, body fluids, secretions, excretions except sweat, nonintact skin, and mucous membranes may contain transmissible infectious agents
  2. Hand hygiene
  3. Use of personal protective equipment (e.g., gloves, gowns, masks)
  4. Safe needle injection practices
  5. Safe handling of potentially contaminated equipment or surfaces
  6. Respiratory hygiene/cough etiquette

- Screening examination
  1. General appearance—posture, dress, grooming, personal hygiene, body or breath odors, facial expression
  2. Anthropometric measurements
     a. Height and weight
     b. Body mass index (BMI) provides measurement of total body fat; weight (kg)/height (m²); tables available to calculate BMI based on the individual’s height and weight
        1. Underweight—BMI less than 18.5
        2. Normal weight—BMI 18.5 to 24.9
        3. Overweight—BMI 25 to 29.9
        4. Obesity—BMI 30 to 39.9
        5. Extreme obesity—BMI 40 or greater
     c. Waist circumference
        1. Provides measurement of abdominal fat as an independent prediction of risk for type 2 diabetes, dyslipidemia, hypertension, and cardiovascular disease in individuals with BMI between 25 and 39.9 (overweight and obesity)
        2. Has little added value in disease risk prediction in individuals with BMI 40 or greater (extreme obesity)
        3. Measure with horizontal mark at uppermost lateral border of right iliac crest and cross with vertical mark at midaxillary line; place tape measure at the cross and measure in horizontal plane around abdomen while patient is standing
        4. In adult female increased relative risk is indicated at greater than 35 in. (88 cm)
  3. Skin, hair, and nails
     a. Skin—color, texture, temperature, turgor, moisture, lesions
     b. Hair—color, distribution, quantity, texture
     c. Nails—color, shape, thickness
     d. Skin lesion characteristics—size, shape, color, texture, elevation, exudate, location, and distribution
        1. Primary lesions—occur as an initial, spontaneous reaction to an internal or external stimulus (macule, papule, pustule, vesicle, wheal)
        2. Secondary lesions—result from later evolution or trauma to a primary lesion (ulcer, fissure, crust, scar)
     e. ABCDEs of malignant melanoma—asymmetry, borders irregular, color blue/black or variegated, diameter greater than 6 mm, elevation

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*Physical Examination (General Screening Examination)*
4. Head, eyes, ears, nose, and throat
   a. Head and neck
      (1) Skull and scalp—no masses or tenderness
      (2) Facial features—symmetrical and in proportion
      (3) Trachea—midline
      (4) Thyroid—palpable with no masses or tenderness, rises symmetrically with swallowing
      (5) Neck—full range of motion (ROM) without pain
      (6) Lymph nodes
         (a) Preauricular, postauricular, occipital, tonsillar, submandibular, submental, superficial cervical, posterior and deep cervical chains, supraclavicular
         (b) Normal findings—less than 1 cm in size, nontender, mobile, soft, and discrete
   b. Eyes
      (1) Visual acuity
         (a) Snellen chart for central vision; normal 20/20
         (b) Rosenbaum card or newspaper for near vision
         (c) Impaired near vision—presbyopia
         (d) Impaired far vision—myopia
      (2) Peripheral vision—estimated with visual fields by confrontation test
      (3) External eye structures—eyebrows equal; lids without lag or ptosis; lacrimal apparatus without exudate, swelling, or excess tearing; conjunctiva clear with small blood vessels and no exudate; sclera white or buff colored
      (4) Eyeball structures
         (a) Cornea and lenses—no opacities or lesions
         (b) Pupils—Pupils Equal, Round, React to Light, and Accommodate (PERRLA)
      (5) Extraocular muscle (EOM) function—symmetrical movement through the six cardinal fields of gaze without lid lag or nystagmus
      (6) Ophthalmoscopic examination—red reflex present with no clouding or opacities; optic disc yellow to pink color with distinct margins; arterioles light red and two-thirds of the diameter of veins with bright light reflex; veins dark red and larger than arterioles with no light reflex; no venous tapering at the arteriole-venous crossings
   c. Ears
      (1) Hearing evaluation
         (a) Whispered voice—able to hear softly whispered words in each ear at 1 to 2 feet
         (b) Weber test—tests for lateralization of sound through bone conduction; normally hear sound equally in both ears
         (c) Rinne test—compares bone and air conduction of sound; normally air-conducted (AC) sound is heard for twice as long as bone-conducted (BC) sound (AC:BC = 2:1)
         (d) Weber and Rinne tests may help in differentiating conductive and sensorineural hearing loss
         (e) Precision, test-retest reproducibility, and accuracy of Weber and Rinne tests have been questioned
      (2) External ears—symmetrical, no inflammation, lesions, nodules, or drainage
         (3) Tragus tenderness may indicate otitis externa; mastoid process tenderness may indicate otitis media
      (4) Otoscopic examination
         (a) External canal—no discharge, inflammation, lesions, or foreign bodies; varied amount, color, and consistency of cerumen
         (b) Tympanic membrane—intact, pearly gray, translucent, with cone of light at 5:00 to 7:00; umbo and handle of malleus visible; no bulging or retraction
      d. Nose and sinuses
         (1) Nasal mucosa pinkish red; septum midline
         (2) Frontal and maxillary sinuses nontender
      e. Mouth and oropharynx
         (1) Mouth—lips, gums, tongue, mucous membranes all pink, moist, without lesions or inflammation; teeth—none missing, free from caries or breakage
         (2) Oropharynx—tonsils, posterior wall of pharynx without lesions or inflammation

5. Respiratory system
   a. Chest symmetrical, anterior/posterior diameter less than transverse diameter; respiratory rate 16 to 20 breaths per minute, rhythm regular; no rib retraction or use of accessory muscles; no cyanosis or clubbing of fingers
   b. Anterior and posterior respiratory expansion—symmetrical movement when client inhales deeply
   c. Tactile fremitus—decreased with emphysema, asthma, pleural effusion; increased with lobar pneumonia, pulmonary edema
   d. Percussion—resonant throughout lung fields
   e. Auscultation—vesicular over most of lung fields; bronchovesicular near main bronchus and bronchial over trachea
      (1) Adventitious sounds—crackles (intermittent, nonmusical, brief sound), caused by air flowing by fluid; rhonchi (low-pitched, snoring quality), caused by air passing over solid or thick secretion; wheezes (high-pitched, shrill quality), caused by air flowing through constricted passageways; pleural friction rub (grating or creaking sound), caused by inflammation of pleural tissue
      (2) Transmitted voice sounds/vocal resonance—normally voice sounds are muffled or indistinct; bronchophony, egophony, whispered pectoriloquy indicate fluid or a solid mass in lungs

6. Cardiovascular system
   a. Blood pressure (BP)—less than 120/80 mm Hg and pulse 60 to 90 beats per minute (bpm), regular, not bounding or thready
   b. Heart
      (1) Apical impulse—fourth to fifth left intercostal space (ICS) medial to the midclavicular line (MCL), no lifts or thrills
      (2) Auscultation at second right ICS; second, third, fourth, fifth left ICS at the sternal border; and fifth left ICS at the MCL
         (a) Assess rate and rhythm
         (b) Identify S1 and S2 at each site—S1, heard best at apex, S2, heard best at base
         (c) Identify extra heart sounds at each site (see Table 2-1)
         (d) Murmurs—note timing, duration, pitch, intensity, pattern, quality, location, radiation, respiratory phase variations
## Table 2-1  Examples of Extra Heart Sounds

<table>
<thead>
<tr>
<th>Heart Sound</th>
<th>Location</th>
<th>Characteristics</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physiologic split S₂</td>
<td>Base; heard best with diaphragm</td>
<td>Heard during inspiration</td>
<td>Normal finding, S₂ actually two sounds that merge during expiration</td>
</tr>
<tr>
<td>Fixed split S₂</td>
<td>Base, heard best with diaphragm</td>
<td>Heard during inspiration and expiration</td>
<td>Delayed closure of pulmonic valve caused by atrial septal defect, right ventricular failure</td>
</tr>
<tr>
<td>Increased S₃ (ventricular gallop)</td>
<td>Apex, heard best with bell</td>
<td>Early diastole, low pitched, increased on inspiration</td>
<td>May be normal finding in young adults and in late pregnancy; Rapid ventricular filling caused by decreased myocardial contractility, heart failure, volume overload</td>
</tr>
<tr>
<td>Increased S₄ (atrial gallop)</td>
<td>Apex, heard best with bell</td>
<td>Late diastole, low pitched, increased on inspiration</td>
<td>May be normal finding in well-trained athletes and older adults; Forceful atrial ejection into distended ventricle caused by aortic stenosis, hypertensive heart disease, cardiomyopathy</td>
</tr>
<tr>
<td>Physiologic murmur</td>
<td>Second to fourth left ICS between left sternal border and apex</td>
<td>Mid-systolic, little radiation, grades 1–3, soft to medium pitched, usually disappears or decreases on sitting</td>
<td>Normal finding, common in pregnancy</td>
</tr>
<tr>
<td>Murmur of mitral stenosis</td>
<td>Apex, heard best with bell</td>
<td>Early to late diastole, no radiation, grades 1–4, low pitched</td>
<td>Narrowed mitral valve restricts forward flow, forceful ejection into ventricle</td>
</tr>
<tr>
<td>Systolic click</td>
<td>Apex, heard best with diaphragm</td>
<td>Mid to late systole, high pitched, increased with inspiration</td>
<td>Mitral valve prolapse</td>
</tr>
<tr>
<td>Pericardial friction rub</td>
<td>Variable, usually best in third ICS to left of sternum, heard best with diaphragm</td>
<td>Grating sound heard throughout cardiac cycle, high pitched, little radiation</td>
<td>Pericarditis</td>
</tr>
</tbody>
</table>

### c. Neck vessels
1. No jugular venous distention
2. Carotid arteries—strong, symmetrical, no bruises

### d. Extremities (peripheral arteries)
1. No erythema, pallor, or cyanosis; no edema or varicosities; skin warm; capillary refill time less than 2 seconds; normal hair distribution; no muscle atrophy
2. Pulses strong and symmetrical—brachial, radial, femoral, dorsalis pedis, posterior tibial
3. Lymph nodes less than 1 cm, nontender, mobile, soft, and discrete—axillary, epitrochlear, inguinal

### 7. Abdomen
a. Symmetrical, no lesions or masses; no visible pulsations or peristalsis
b. Auscultation—active bowel sounds; no vascular bruits or friction rubs
c. No guarding, tenderness, or masses on palpation
d. Liver border—edge smooth, sharp, nontender; no more than 2 cm below right costal margin
e. Spleen and kidneys—usually not palpable
f. Aorta—slightly left of midline in upper abdomen; less than 3 cm width
g. Percussion— tympany is predominant tone; dullness over organs or any masses
h. Liver span—normally 6 to 12 cm at the right MCL

### i. Splenic dullness—sixth to 10th ICS just posterior to midaxillary line on left side

### j. No tenderness on fist percussion over the costovertebral angle; costovertebral angle tenderness (CVAT) may indicate kidney problem

### 8. Musculoskeletal system
a. No gross deformities; body aligned, extremities symmetrical, normal spinal curvature, no involuntary movements
b. Muscle mass and strength equal bilaterally; full ROM without pain
c. No inflammation, nodules, swelling, crepitus, or tenderness of joints

### 9. Neurologic system
a. Cranial nerves (CN)—CN II through XII routinely tested, CN I tested if abnormality is suspected
1. CN I (olfactory)—test ability to identify familiar odors
2. CN II (optic)—test visual acuity, peripheral vision, and inspect optic discs
3. CN III, IV, VI (oculomotor, trochlear, abducens)—observe for PERRLA, EOM function, and ptosis
4. CN V (trigeminal)—palpate strength of temporal and mas-eter muscles, test for sharp/dull and light touch sensation on forehead, cheeks, and chin
5. CN VII (facial)—observe for any weakness, asymmetry, or abnormal movements of face
(6) CN VIII (acoustic)—assess auditory acuity, perform Weber and Rinne tests
(7) CN IX and X (glossopharyngeal and vagus)—observe ability to swallow, symmetry of movement of soft palate and uvula when client says, “Ah,” gag reflex, any abnormal voice quality
(8) CN XI (spinal accessory)—observe and palpate strength and symmetry of trapezius and sternocleidomastoid muscles
(9) CN XII (hypoglossal)—observe tongue for any deviation, asymmetry, or abnormal movement

b. Cerebellar function—smooth coordinated gait, able to walk heel to toe, balance maintained with eyes closed (Romberg test), rapid rhythmic alternating movements smooth and coordinated
c. Sensory function—able to identify superficial pain and touch, able to identify vibration on bony prominences and passive position change of fingers and toes, normal response to discriminatory sensation tests, all findings symmetrical
d. Deep tendon reflexes—brisk and symmetrical (biceps, brachioradialis, triceps, patellar, Achilles)

10. Mental status
a. Physical appearance and behavior—well groomed, emotional status appropriate to situation, makes eye contact, posture erect
b. Cognitive abilities—alert and oriented, able to reason, recent and remote memory intact, able to follow directions
c. Emotional stability—no signs of depression or anxiety, logical thought processes, no perceptual disturbances
d. Speech and language skills—normal voice quality and articulation, coherent, able to follow simple instructions
e. Mini Mental Status Examination (MMSE)—standardized screening tool used for mental status assessment
f. Depression screening tools—Beck Depression Inventory, Zung Self-Rating Depression Scale, Patient Health Questionnaire (PHQ), Geriatric Depression Scale, Edinburgh Postnatal Depression Scale (EPDS)

• Detailed female reproductive examination

1. Breasts
a. The female breast extends from the second to the sixth ribs and from the sternal border to the midaxillary line
b. Inspect breasts with client in sitting position and hands pushing against hips; view breasts from all sides to assess for symmetry and skin changes

(1) Tanner sexual maturity rating in adolescent
(2) Skin—smooth, color uniform, no erythema, masses, retraction, dimpling, or thickening
(3) Symmetry—breast shape or contour is symmetrical; some difference in size of breasts and areola is common and usually normal
(4) Nipples—pointing in same direction, no retraction or discharge, no scaling; long-standing nipple inversion is usually normal variation
c. Palpate axillary, supraclavicular, infraclavicular lymph nodes with patient in sitting position and arms relaxed at sides
d. Palpate breasts with client lying down, arm above head, small pillow under shoulder/lower back on side being examined if needed to provide even breast tissue distribution

(1) Include entire area from midaxillary line, across inframammary ridge and fifth/sixth rib, up lateral edge of sternum, across clavicle, back to midaxillary line
(2) Palpate using finger pads of middle three fingers with overlapping dime-shaped circular motions in a vertical strip pattern over entire area including nipples; do not squeeze nipples unless client indicates she has spontaneous nipple discharge
(3) Palpate each area of breast tissue using three levels of pressure—light, medium, and deep
(4) Follow same procedures for client with implants because correctly placed implants are located behind breast tissue
(5) Include palpation of chest wall, skin, and incision area in client with mastectomy
(6) Breast tissue—consistency varies from soft fat to firmer glandular tissue; physiologic nodularity may be present; there may be a firm ridge of compressed tissue under lower edge of breasts
(7) Describe any palpable mass or lymph nodes in terms of location according to clock face as examiner faces client—size, shape, mobility, consistency, delimitation, and tenderness
(8) Describe any nipple discharge in terms of whether spontaneous/not spontaneous, bilateral/unilateral, single or multiple ducts, color, and consistency

2. Pelvic examination
a. Prepare equipment/supplies prior to examination
b. Conduct pelvic examination with attention to preventing contamination of equipment such as examination lights and lubricant containers
c. Positioning—client lying supine with head and shoulders elevated, lithotomy position, buttocks extending slightly beyond edge of table, draped from midabdomen to knees, drape depressed between knees to allow eye contact
d. Inspection and palpation of external structures—mons pubis, labia majora and minora, clitoris, urethral meatus, vaginal introitus, paraurethral (Skene's) glands, Bartholin's glands, perineum

(1) Tanner sexual maturity rating in adolescent
(2) Mons pubis—pubic hair inverted triangular pattern, skin smooth with uniform color
(3) Labia majora—may be gaping or closed and dry or moist, tissue soft and homogenous, covered with hair in postpubertal female
(4) Labia minora—moist and dark pink, tissue soft and homogenous
(5) Clitoris—approximately 2 cm or less in length and 0.5 cm in diameter
(6) Urethral meatus—irregular opening or slit
(7) Vaginal introitus—thin vertical slit or large orifice, irregular edges from hymenal remnants, moist
(8) Skene's and Bartholin's glands—opening of Skene's glands just posterior to and on each side of urethral meatus; opening of Bartholin's glands located posteriorly on each side of vaginal orifice and not usually visible
(9) Perineum—consists of tissue between introitus and anus; smooth; may have episiotomy scar
(10) Note presence of any abnormal hair distribution, discoloration, erythema, swelling, atrophy, lesions, masses, discharge, malodor, fistulas, tenderness
e. Pelvic floor muscles—form supportive sling for pelvic contents and functional sphincters for vagina, urethra, and rectum; able to constrict introitus around examining finger; no anterior or posterior bulging of vaginal walls, incontinence, or protrusion of cervix or uterus when client bears down
f. Inspection of internal structures
(1) Vaginal walls—pink, rugated, homogenous; may have thin, clear/cloudy, odorless discharge
(2) Cervix—midline, smooth, round, pink, about 2.5 cm in diameter; protrudes 1–3 cm into vagina; points posteriorly with antverted uterus, anteriorly with retroverted uterus, horizontally with midposition uterus; nabothian cysts may be present; os small and round (nulliparous); may be oval, slit-like, or stellate if parous; may have area of darker red epithelial tissue around os if squamocolumnar junction is on ectocervix
(3) Note presence of discoloration; erythema; swelling; atrophy; friable tissue; lesions; masses; discharge that is profuse, malodorous, thick, curdy, frothy, gray, green, yellow, or adherent to vaginal walls
g. Palpation of internal structures
(1) Vaginal walls—smooth, nontender
(2) Cervix—smooth, firm, mobile, nontender, about 2.5 cm in diameter; protrudes 1–3 cm into vagina
(3) Uterus—smooth, rounded contour, firm, mobile, nontender; 5.5 to 8 cm long and pear shaped in nulliparous female; may be 2 to 3 cm larger in parous female; position anteverted, anteflexed, midplane, retroverted, or retroflexed
(4) Adnexa—fallopian tubes nonpalpable; ovaries ovoid, smooth, firm, mobile, slightly tender; size during reproductive years 3 cm × 2 cm × 1 cm
(5) Note presence of enlargements, masses, irregular surfaces, consistency other than firm, deviation of positions, immobility, tenderness
h. Rectovaginal examination
(1) Purpose—palpate retroverted/retroflexed uterus; assess pelvic pathology; not recommended for colorectal cancer screening
(2) Repeat the maneuvers of the bimanual examination with index finger in vagina and middle finger in rectum
(3) Rectum—smooth, nontender without masses; firm anal sphincter tone
(4) Rectovaginal septum—smooth, intact, nontender, without masses

**Male-focused reproductive health assessment**
1. Health history
   a. Reason for visit and any presenting problems/illness
   b. Review of past health history, current health status, family health history, psychosocial/cultural health history as appropriate for reason for visit
   c. Review of systems—endocrine, genitourinary
   d. Sexual health history
      (1) Age at first intercourse—consensual/nonconsensual
      (2) History of sexual abuse or sexual assault
   e. Tanner sexual maturity rating in adolescent
   f. Pubic hair—skin smooth with uniform color, hair course in triangular pattern pointing toward umbilicus
   g. Penis—skin smooth without hair, no lesions, no tenderness; prepuce (foreskin) if present retracts easily; may have some smegma under prepuce; glans penis without lesions or erythema; urethral meatus on ventral surface at tip of glans penis, without lesions or erythema
   h. Scrotum—loose, wrinkled skin darker pigment than rest of body; no lesions; may appear asymmetrical with one testis, usually the left testis, lower than right testis
   i. Testes—oval, smooth, rubbery, move freely when palpated, sensitive to pressure but not tender
   j. Epididymis—posterolateral surface of testes, comma shaped, smooth, softer than testes, nontender
   k. Spermatid cords—starts at lower end of epididymis and extends to external inguinal ring; smooth; nontender
   l. Prostate gland—surrounds urethra at bladder neck; heart shaped, approximately 4 × 3 × 2 cm, smooth, rubbery, nontender

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**Nongynecologic Diagnostic Studies/Laboratory Tests**

- Complete blood count (CBC) with differential
  1. Red blood cell (RBC) count—measurement of RBCs per cubic millimeter of blood
     a. Normal findings (adult female)—4.2 to 5.4 million/mm³
     b. Low values—hemorrhage, hemolysis, dietary deficiencies, hemoglobinopathies, bone marrow failure, chronic illness, medications
     c. High values—dehydration, diseases causing chronic hypoxia such as congenital heart disease, polycythemia vera, medications
  2. Hematocrit (Hct)/Hemoglobin (Hgb)—rapid indirect measurement of RBC count
     a. Hct—percentage of total blood volume that is made up of RBCs
        (1) Normal findings (nonpregnant adult female)—37% to 47%
(2) Normal findings (pregnant adult female)—33% or greater in first and third trimesters, 32% or greater in second trimester
b. Hgb—measurement of total Hgb (which carries oxygen) in the blood
(1) Normal findings (nonpregnant adult female)—12 to 16 g/dL
(2) Normal findings (pregnant adult female)—11 g/dL or greater in first and third trimesters, 10.5 g/dL or greater in second trimester
c. Low values—anemia, hemoglobinopathies, cirrhosis, hemorrhage, dietary deficiency, bone marrow failure, renal disease, chronic illness, some cancers
d. High values—erythrocytosis, polycythemia vera, severe dehydration, severe chronic obstructive pulmonary disease
e. Heavy smokers and individuals living at higher elevations may also have higher Hgb levels

3. Red blood cell indices—provide information about size, weight, and Hgb concentration of RBCs; useful in classifying anemias
a. Mean corpuscular volume (MCV)—average volume or size of a single RBC
(1) Normal finding—80 to 95 mm³, normocytic
(2) Microcytic/abnormally small—seen with iron-deficiency anemia and thalassemia
(3) Macrocytic/abnormally large—seen with megaloblastic anemias such as vitamin B deficiency and folic acid deficiency
b. Mean corpuscular hemoglobin (MCH)—average amount or weight of Hgb within an RBC
(1) Normal finding—27 to 31 pg/cell
(2) Causes for abnormalities same as with MCV
c. Mean corpuscular hemoglobin concentration (MCHC)—average concentration or percentage of Hgb within a single RBC
(1) Normal finding—32 to 36 g/dL, normochronic
(2) Decreased concentration or hypochromic—seen with iron-deficiency anemia and thalassemia

4. White blood cell (WBC) count with differential—provides information useful in evaluating individual with infection, neoplasm, allergy, or immunosuppression
a. Normal finding for total WBC (adult)—5,000 to 10,000/mm³
b. Increased WBC count—seen with infection, trauma, inflammation, some malignancies, dehydration
c. Decreased WBC count—seen with some drug toxicities, bone marrow failure, overwhelming infections, immunosuppression
d. May be elevated in late pregnancy and during labor
e. Neutrophils—increased with acute bacterial infections and trauma; increased immature forms (band or stab cells) referred to as a “shift to left,” seen with ongoing acute bacterial infection
f. Basophils and eosinophils—increased with allergic reactions and parasitic infections; not increased with bacterial or viral infections
g. Lymphocytes and monocytes—increased with chronic bacterial and acute viral infections

5. Peripheral blood smear—microscopic examination of smear of peripheral blood to examine RBCs, platelets, and leukocytes
6. Platelet count—used to evaluate abnormal bleeding or blood clotting
   a. Normal finding (adult)—150,000 to 400,000/mm³
   b. Low count (thrombocytopenia)—hypersplenism, hemorrhage, leukemia, cancer chemotherapy, infection
   c. High count (thrombocytosis)—some malignant disorders, polycythemia vera, rheumatoid arthritis

• Urinalysis—dipstick and/or microscopic evaluation of urine
  1. Includes evaluation of appearance, color, odor, pH, protein, specific gravity, leukocyte esterase, nitrites, ketones, crystals, casts, glucose, WBCs, and RBCs
  2. Obtain midstream clean-catch specimen so culture can be performed if urinalysis indicates infection

3. Normal findings
   a. No nitrites, ketones, crystals, casts, or glucose
   b. Clear, amber yellow, aromatic
   c. pH 4.6 to 8.0
   d. Protein 0 to 8 mg/dL
   e. Specific gravity (adult)—1.005 to 1.030
   f. Leukocyte esterase negative
g. WBCs 0 to 4 per high-power field (HPF)
h. RBCs at 2 or less

• Blood glucose—used for diagnosis and evaluation of diabetes mellitus
  1. Fasting glucose
     a. No caloric intake for at least 8 hours
     b. Normal finding (adult)—less than 100 mg/dL
     c. Impaired fasting glucose—100 to 125 mg/dL
     d. Diagnostic for diabetes—126 mg/dL or greater
  2. Two-hour postload glucose during oral glucose tolerance test (OGTT)
     a. Sample obtained 2 hours after a glucose load containing the equivalent of 75 g of glucose dissolved in water
     b. Normal finding—less than 140 mg/dL
     c. Impaired glucose tolerance—140 mg/dL to 199 mg/dL
     d. Diagnostic for diabetes—200 mg/dL or greater
  3. American Diabetes Association (ADA) criteria for the diagnosis of diabetes mellitus with blood glucose tests
     a. Classic symptoms of hyperglycemia plus random nonfasting glucose concentration of 200 mg/dL or greater
     b. Fasting glucose of 126 mg/dL or greater
     c. Two-hour post-glucose 200 mg/dL or greater
     d. Repeat testing on a subsequent day to confirm diagnosis
  4. HbA1c or A1c
     a. May be used for the diagnosis of diabetes
     b. Threshold for diagnosis of diabetes is 6.5% or greater; prediabetes is 5.7% to 6.4%
     c. Gold standard for measurement of long-term (previous 60–90 days) glycemic control in individuals with diabetes
     d. Reliable tool for evaluating need for drug therapy and monitoring effectiveness of therapy
     e. Good diabetic control—less than 7%
• Blood urea nitrogen (BUN) and creatinine—used in evaluation of renal function

1. BUN—indirect measure of renal and liver function
   a. Normal finding (adult)—10 to 20 mg/dL
   b. Increased levels—hypovolemia, dehydration, reduced cardiac function, gastrointestinal bleeding, starvation, sepsis, renal disease
   c. Decreased levels—liver failure, malnutrition, nephrotic syndrome

2. Serum creatinine—indirect measure of renal function
   a. Normal finding (adult female)—0.5 to 1.1 mg/dL
   b. Increased levels—renal disorders, dehydration
   c. Decreased levels—debulitation and decreased muscle mass

3. Creatinine clearance—calculated from serum and 24 hour urine creatinine levels to determine rate at which kidneys are clearing creatinine from the blood, reflecting glomerular filtration rate (GFR)
   a. Normal finding—serum creatinine (adult female), 0.5 to 1.1 mg/dL; 24-hour urine creatinine, 500–2,000 mg; GFR determined with equation that takes into account age, gender, and race
   b. Increased levels—increased muscle mass, exercise, pregnancy, high dietary meat intake, some medications
   c. Decreased levels—impaired renal function, reduced renal blood flow, heart failure, shock, some medications

• Lipid profile—determines risk for coronary heart disease and evaluation of hyperlipidemia

1. Includes total cholesterol, triglycerides, high-density lipoproteins (HDLs), and low-density lipoproteins (LDLs)

2. Fast for 12 to 14 hours prior to obtaining sample

3. Total cholesterol normal level (adult)—less than 200 mg/dL; may be elevated in pregnancy

4. Triglycerides normal finding (adult female)—35 to 135 mg/dL; may be elevated in pregnancy

5. HDL—removes cholesterol from peripheral tissues and transports to liver for excretion
   a. Normal level (adult)—40 mg/dL or greater
   b. Low levels associated with increased risk for heart and peripheral vascular disease

6. LDL—cholesterol carried by LDL can be deposited into peripheral tissues
   a. Normal finding (adult)—less than 130 mg/dL
   b. High levels associated with increased risk for heart and peripheral vascular disease

• Thyroid function studies

1. Thyroid-stimulating hormone (TSH)—used to diagnose hypothyroidism and primary hypothyroidism, differentiate primary from secondary hypothyroidism, and monitor thyroid replacement or suppression therapy
   a. Normal finding (adult)—0.4 to 4.12 mU/mL
   b. Increased levels—seen with primary hypothyroidism and thyroiditis
   c. Decreased levels—seen with secondary hypothyroidism, hyperthyroidism, suppressive doses of thyroid medication

2. Free thyroxine (FT4)—used in diagnosis of thyroid disease
   a. Normal finding (adult female)—0.58 to 1.64 ng/dL
   b. Increased levels—hyperthyroidism and acute thyroiditis
   c. Decreased levels—hypothyroidism

3. Total thyroxine (T4)
   a. Normal finding (adult female)—4.5 to 12.0 µg/dL
   b. Measurement affected by increases in thyroxine-binding globulin (TBG)
   c. Causes for increased TBG include pregnancy, oral contraceptive use, and estrogen therapy

• Blood type and Rh factor—used to determine blood type in pregnant women

1. Blood types are grouped according to presence or absence of antigens A, B, and Rh on RBCs

2. Individual without a particular antigen may develop antibodies to that antigen if exposed through blood transfusion or fetal-maternal blood mixing

3. Blood type O negative (universal donor because no antigens on RBCs), AB positive (universal recipient because no antibodies will be present to react to transfused blood)

• Infectious disease tests

1. Rubella (German measles)
   a. Hemagglutination inhibition (HAI) test—used to detect immunity to rubella and to diagnose rubella infection
      (1) Titer of 1:10 or greater indicates immunity to rubella
      (2) High titers (1:64 or greater) may indicate current rubella infection
   b. Rubella IgM antibody titer—used if pregnant woman has a rash suspected to be from rubella; if titer is positive, recent infection has occurred; IgM antibodies appear 1 to 2 days after onset of rash and disappear 5 to 6 weeks after infection

2. Hepatitis B (HBV) tests
   a. Hepatitis B surface antigen (HBsAg)—rises before onset of clinical symptoms, peaks during first week of symptoms, and returns to normal by time jaundice subsides
      (1) Indicates active HBV infection—individual is infectious
      (2) Individual is considered a carrier if HBsAg persists
   b. Hepatitis B surface antibody (HBsAb)—appears 4 weeks after disappearance of surface antigen
      (1) Indicates end of acute infectious phase and signifies immunity to subsequent infection
      (2) Also used to denote immunity after administration of hepatitis B vaccine

3. Hepatitis C (HCV) tests
   a. HCV antibody assay (rapid fingerstick/venipuncture blood test or laboratory test)
b. Follow reactive antibody test with HCV RNA test; positive HCV RNA test indicates current HCV infection; negative HCV RNA test indicates either past resolved HCV infection or false HCV antibody positivity

4. Tuberculosis (TB) tests
a. Usually positive within 6 to 8 weeks after infection
b. Does not indicate whether infection is active or dormant
c. Centers for Disease Control and Prevention (CDC) definition of positive purified protein derivative (PPD) skin test
(1) High-risk population 5 mm induration or greater
(2) Moderate-risk population 10 mm induration or greater
(3) General population 15 mm induration or greater
d. Once positive reaction, usually persists for life
e. False negative PPD test may result from incorrect administration (must be intradermal) or immunosuppression
f. False positive PPD test may result if individual had prior immunization with bacillus Calmette–Guérin (BCG) vaccine
g. PPD test is contraindicated if history of BCG vaccination or active TB because severe local reaction can occur
h. TB blood test (interferon-gamma release assay [IRGA]) measures how immune system reacts to bacteria causing TB; result reported as positive or negative; preferred method for person who has had BCG vaccination or will have trouble returning in 48–72 hours to read PPD skin test

• Sickle cell screening (Sickle Cell Prep, Sickledex)—used to screen for sickle cell disease and trait
  1. Positive test—presence of Hgb S indicates sickle cell disease or trait
  2. Hgb electrophoresis is definitive test to be performed if screening test is positive; identifies Hgb type and quantity

• Liver function studies
  1. Bilirubin
     a. Normal findings (adult)—total bilirubin 0.3 to 1.0 mg/dL; direct (conjugated) bilirubin 0.1 to 0.3 mg/dL; indirect (unconjugated) bilirubin 0.2 to 0.8 mg/dL
     b. Elevated direct bilirubin level—occurs with gallstones and obstruction of extrahepatic duct
     c. Elevated indirect bilirubin level—seen with hepatocellular dysfunction (hepatitis, cirrhosis) and hemolytic anemias
  2. Albumin
     a. Normal finding (adult)—3.5 to 5.0 g/dL
     b. Increased levels—dehydration
     c. Decreased levels—seen with liver disease, malabsorption syndromes, nephropathies, severe burns, malnutrition, and inflammatory disease
  3. Liver enzymes
     a. Alkaline phosphatase (ALP)
        (1) Normal finding—30 to 120 U/L
        (2) Elevated levels—liver disease, bone disease, and myocardial infarction
     b. Aspartate aminotransferase (AST), alanine aminotransferase (ALT), lactic dehydrogenase (LDH)
        (1) Normal findings—AST 0–35 U/L, ALT 4–36 U/L, LDH 100–190 U/L
        (2) Useful in differentiating cause for ALP elevation
     c. Gamma-glutamyl transpeptidase (GGT)
        (1) Normal finding—8–38 U/L
        (2) Elevated levels with liver disease, myocardial infarction, pancreatic disease, and heavy or chronic alcohol use

• Stool for occult blood
  1. Annual screen for individuals 50 years of age or older; evaluation of gastrointestinal conditions that may cause gastrointestinal (GI) bleeding
  2. Positive test—may indicate GI cancer or polyps, peptic ulcer disease, inflammatory or ischemic bowel disease, GI trauma, bleeding caused by medications
  3. Several interfering factors can cause false positives or negatives
    a. Red meat and some raw fruits and vegetables, if consumed within three days prior to or during the test period, can result in false positive
    b. Large amounts of vitamin C consumed within three days prior to or during the test period can result in false negative
  4. Positive test requires further evaluation with sigmoidoscopy, colonoscopy, or barium enema

• Autoantibodies/antinuclear antibodies (ANA)
  1. Test used as part of diagnostic workup for systemic lupus erythematosus (SLE) and other connective tissue autoimmune disorders such as scleroderma, rheumatoid arthritis, Sjögren’s syndrome
  2. Ninety-five percent of individuals with SLE will have positive ANA; titer may be negative early in disease
  3. Test results must be correlated with other criteria for the particular autoimmune disease
  4. Antinuclear antibody subtypes may be used to aid in diagnosis—anti-dsDNA and anti-Sm highly specific to SLE but variable sensitivity
  5. Higher titers indicate more active disease; lower titers associated with effective treatment

General Health Promotion

• Nutrition
  1. Evaluation of nutritional status
    a. Anthropometric measurements—height, weight, BMI, waist circumference
    b. General appearance—skin, hair, muscle mass
    c. Biochemical measurements—Hgb/Hct, lipid analysis, serum albumin, serum glucose, serum folate
    d. 24-hour diet recall or three- to four-day food diary
    e. Use of vitamin, mineral, and herbal supplements
  2. Dietary Guidelines for Americans 2015–2020 (U.S. Department of Health and Human Services [USDHHS], 2015)—key recommendations
    a. Choose a healthy eating pattern at an appropriate caloric level to help achieve and maintain a healthy body weight, support nutrient adequacy, and reduce risk of chronic disease
    b. Choose nutrient dense foods—nutrients and other beneficial substances not diluted by addition of calories from added solid fats, sugars, or refined starches, or by solid fats naturally present in the food
c. A healthy eating pattern includes:
   (1) Variety of vegetables from all subgroups—dark green, red and orange, legumes, starchy and others
   (2) Fruits, especially whole fruits
   (3) Fat-free or low-fat dairy products—milk, yogurt, cheese, and/or fortified soy products
   (4) Variety of protein foods—seafood, lean meats and poultry, eggs, legumes, nuts, seeds, and soy products
   (5) Oils
d. A healthy eating pattern limits:
   (1) Saturated fats and trans fats; added sugars, sodium, and alcohol
   (2) Less than 10 % of calories each day from saturated fats; trans fats as low as possible
   (3) Less than 10% of calories each day from added sugars
   (4) Less than 2,300 mg (about one teaspoon) each day of sodium
   (5) Alcohol only in moderation—up to one drink per day for women and two drinks for men; one drink = 12 ounces of beer, 5 ounces of wine, 1.5 ounces of hard liquor

3. Calcium and vitamin D requirements for women
a. Institute of Medicine (2010)
   (1) 14 to 18 years of age—1,300 mg/day of calcium; same amount if pregnant or lactating
   (2) 19 to 50 years of age—1,000 mg/day of calcium; same amount if pregnant or lactating
   (3) 51 years of age and older—1,200 mg/day of calcium
   (4) 14 to 70 years of age—600 IU/day of vitamin D
   (5) 71 years of age and older—800 IU/day of vitamin D
   (1) Adults age 50 and younger—1,000 mg/day of calcium; 400 to 800 IU/day of vitamin D
   (2) Adults age 51 and older—1,200 mg/day of calcium; 800 to 1,000 IU of vitamin D
c. Sources of calcium—milk, yogurt, soybeans, tofu, canned sardines and salmon with edible bones, cheese, fortified cereals and orange juice, supplements
d. Sources of vitamin D—fortified milk, egg yolks, saltwater fish, liver, supplements, regular exposure to direct sunlight

4. Folate requirements for women of childbearing age
a. 0.4 mg folic acid/day
b. Women of childbearing age who have had an infant with neural tube defect may benefit from a higher dose of up to 4 mg folic acid/day starting at least one month before trying to become pregnant and continuing through first two to three months of pregnancy
c. Sources—dried beans, leafy green vegetables, citrus fruits and juices, fortified cereals; most multivitamins contain 0.4 mg folic acid

5. Iron requirements for nonpregnant women
a. 14 to 18 years of age—15 mg/dL each day
b. 19 to 50 years of age—18 mg/dL each day
c. 51 years of age or older—8 mg/dL each day
d. Sources—meat, fish, poultry, fortified cereals, dried fruits, dark green vegetables, supplements

6. Special concerns
a. Eating disorders—reviewed elsewhere in this text
b. Vegetarians—plan diet to avoid deficiencies in protein, calcium, iron, vitamin B12, and vitamin D
c. Older adults—consider effects of chronic illness, medications, isolation, decrease in ability to taste and smell, limited income
d. Need for more limited sodium intake (no more than 1,500 mg each day)—sodium intake may have greater effect on blood pressure for some individuals (e.g., age over 50 years; African Americans; individuals with hypertension, diabetes, chronic kidney disease) (USDHHS, 2015)
e. Increased risk for vitamin D deficiency—age over 59 years, dark skin, residing in northern areas, overweight/obese, milk allergy/lactose intolerance, digestive diseases such as Crohn’s disease or celiac disease
f. Postbariatric surgery—requires consultation with nutritionist or bariatric specialist

- Physical activity
  1. There is strong evidence that regular physical activity lowers risk for heart disease, stroke, high BP, adverse lipid profile, type 2 diabetes, metabolic syndrome, colon and breast cancers; prevents weight gain and promotes weight loss; improves cardiovascular and muscular fitness; reduces depression; improves cognitive function in older adults
  2. Sixty percent of Americans are not regularly physically active and 25% report no physical activity at all

   a. Engage in at least 150 minutes of moderate intensity or 75 minutes of vigorous intensity aerobic physical activity each week; performed for at least 10 minutes per episode; spread throughout the week
   b. Moderate intensity exercise achieves 50% to 69% of maximum heart rate—maximum average heart rate equals 220 minus age
   c. Examples of aerobic physical activity—brisk walking, running, bicycling, jumping rope, swimming
   d. Engage in muscle-strengthening activities of moderate or high intensity involving all major muscle groups two or more days each week
   e. Examples of muscle-strengthening activities—weight lifting, exercises with elastic bands or use of body weight (push-ups, tree climbing) for resistance
   f. Include bone-strengthening activity in exercise regimen—running, brisk walking, weight training, tennis, dancing

- Routine screening recommendations
  1. Clinical breast examination (CBE)
     a. American Cancer Society (ACS) does not recommend CBE for breast cancer screening among average-risk women at any age; average risk is no personal history of breast cancer, no suspected or confirmed genetic mutation known to increase risk of breast cancer, no previous radiotherapy to the chest at a young age
     b. American Congress of Obstetricians and Gynecologists (ACOG)—recommends CBE every year for women aged 19 and older
     c. United States Preventive Services Task Force (USPSTF)—evidence insufficient to assess the balance of benefits and harms of CBE if woman is being screened with mammograms (Grade I)
CHAPTER 2 General Health Assessment and Health Promotion

2. Mammogram
   a. ACS yearly beginning at age 45 years for women at average risk; women age 55 and older can transition to biennial screening or continue annual screening if they prefer
   b. ACOG—yearly starting at age 40 years
   c. USPSTF—biennial screening from age 50 to 74 years (Grade B recommendation)
   d. ACS and ACOG—no definitive age to discontinue mammogram screening; base on woman's health and whether or not she would be candidate for treatment of breast cancer
   e. USPSTF—evidence insufficient to assess the balance of benefits and harms of screening mammography in women aged 75 years or older (Grade I)

3. Pap test (ACS and ACOG)
   a. Begin at age 21 years
   b. Age 21 to 29 years—screen every three years with cytology alone; do not use HPV testing for screening in this age group
   c. Age 30 to 65 years—screen with HPV test and cytology every five years (preferred); screen with cytology alone every three years (acceptable)
   d. Age > 65 years—no screening following adequate negative prior screening; do not resume screening even if woman reports new sexual partner; women with history of CIN2 or a more serious diagnosis should continue routine screening for at least 20 years after spontaneous regression or treatment
   e. No screening after hysterectomy with cervix removed unless history of CIN2 or more severe diagnosis in past 20 years or cervical cancer ever

4. Chlamydia screening—Per CDC, yearly screening for all sexually active females 24 years of age or younger

5. Blood pressure—Per National High Blood Pressure Education Program (NHBPEP) of the National Heart, Lung, and Blood Institute (NHLBI), at least every two years for adults

   a. Screen women aged 45 years and older for lipid disorders if they are at increased risk for coronary heart disease (CHD) (Grade A Strong Recommendation)
   b. Screen women aged 20 to 45 years for lipid disorders if they are at increased risk for coronary heart disease (Grade B Recommendation)
   c. CHD risk factors for women include being 55 years of age or older, family history of premature CHD (male relative < 55 years, female relative < 65), cigarette smoking, hypertension, HDL at less than 40 mg/dL, diabetes mellitus
   d. Screen with total cholesterol and HDL on nonfasting or fasting samples
   e. No recommendation on interval of screening; USPSTF states every five years is reasonable

7. Stool based tests (ACS)
   a. Beginning at age 50
   b. Guaiac fecal occult blood test—multiple-stool sample, at-home test detects hidden blood in stool; yearly screening
   c. Stool DNA test—single sample, at-home test detects DNA from cancer or polyp cells as well as blood; screening every three years
   d. Colonoscopy recommended if abnormal results

8. Tests that find colorectal polyps and cancer
   a. ACS beginning at age 50 years colonoscopy every 10 years, flexible sigmoidoscopy every five years, double-contrast barium enema every five years, or computed tomography (CT) colonography (virtual colonoscopy) every five years
   b. ACOG—colonoscopy every 10 years for average-risk women beginning at age 50 years and at age 45 years for African American women
   c. More frequent testing and starting at younger age for those with risk factors including inflammatory bowel disease and personal or family history of colonic polyps or colon cancer

   a. Every three years starting at age 45
   b. More frequent testing and starting at a younger age if BMI > 25 and one or more other risk factors
   c. Risk factors—obesity; hypertension; dyslipidemia; cardiovascular disease; polycystic ovarian syndrome; diabetes in first-degree relative; African American, Asian, Hispanic, Native American, Pacific Islander; history of gestational diabetes or baby weighing more than 9 lbs at birth
   d. Use HbA1c, fasting glucose, or two-hour 75-g glucose tolerance test

10. Thyroid function
    a. USPSTF—routine screening for thyroid function is not warranted in asymptomatic individuals
    b. ACOG—TSH periodically for women with an autoimmune condition or strong family history of thyroid disease

11. Tuberculosis
    a. CDC and ACOG—perform on all individuals at high risk
    b. See discussion elsewhere in this text for more information on tuberculosis and risk factors

    a. Every three to five years for African Americans age 20 to 39 years
    b. Every two to four years for individuals age 40 to 64 years and every one to two years beginning at age 65 regardless of race
    c. Yearly for diabetic individuals regardless of age

13. Dental—American Dental Association recommends that adults should have routine dental care and preventive services, including oral cancer screening, at least once every year

    a. Screen all women 65 years of age or older for osteoporosis/osteopenia with BMD test
    b. Screen postmenopausal women younger than 65 years of age with risk factors associated with increased fracture risk
    c. Risk factors—low BMI, history of low-trauma fracture, smoking, alcohol intake ≥ three drinks/day, family history of hip fracture or osteoporosis

15. HIV—CDC, USPSTF
    a. Screen all adolescents and adults seen in any healthcare setting unless decline (opt-out screening)
    b. Screen individuals at high risk for HIV infection at least annually
c. Include in routine panel of prenatal screening tests for all pregnant women unless decline (opt-out screening)
d. Repeat screening in third trimester in areas with elevated rates of HIV infection among pregnant women
e. Screen women who present in labor who are untested and whose HIV status is unknown

16. Hepatitis C virus (HCV)—CDC
   a. Screen all individuals born between 1945 and 1965 once if no other risk factors
   b. Screen all individuals who have received blood products with clotting factor before 1987 or who have had blood transfusion or organ transplant before July 1992
c. Screen all individuals who currently inject or have ever injected drugs
d. Screen all individuals who have HIV infection
e. Screen all individuals who have been on hemodialysis for several years
f. Screen healthcare workers or workers otherwise at occupational risk, their sex partners, men who have sex with men, household contacts or sex partners of those with HBV infection, injection drug users, healthcare workers or workers otherwise at occupational risk, inmates of long-term correctional institutions
g. Screen infants born to mothers with hepatitis C

17. Lung cancer screening—USPSTF, ACS
   a. Screen individuals age 55 to 74 years of age (USPSTF upper age 80 years) in fairly good health who have risk factors for lung cancer
   b. Risk factors—30+ pack-year smoking history and still smoking or quit within last 15 years
c. Low-dose CT scan every year

• Immunizations—CDC

1. Hepatitis B
   a. Effective in 95% of cases in preventing hepatitis B virus (HBV) infection
   b. High-risk groups for whom HBV vaccination is recommended include, but are not limited to, individuals who have multiple sex partners, men who have sex with men, household contacts or sex partners of those with HBV infection, injection drug users, healthcare workers or workers otherwise at occupational risk, inmates of long-term correctional institutions
   c. Three-dose series, with the second and third doses at one and six months after the first dose
d. If three-dose series is interrupted, the series does not need to be restarted; give second dose as soon as possible and third dose at least eight weeks later

2. Influenza
   a. Recommended yearly for all individuals age six months and older, including pregnant women
   b. Administration of inactivated influenza vaccine is considered safe at any stage of pregnancy and during lactation
c. Inactivated influenza vaccine (IIV) given intramuscularly or intradermally in one dose
d. Live attenuated influenza vaccine (LAIV) given intranasally—only use for healthy, nonpregnant individuals between 2 and 49 years of age

3. Pneumococcus (pneumococcal conjugate 13-valent vaccine – [PCV13] and pneumococcal polysaccharide vaccine [PPSV23])
   a. PCV13 and PPSV23 recommended one time for all immunocompetent individuals age 65 and older
   b. For immunocompetent individuals age 65 and older, PCV13 and PPSV23 should be given at least one year apart; if individual has not had either vaccine start with PCV 13
c. PCV13 recommended for adults younger than 65 years of age with immunocompromising conditions, functional or anatomic asplenia, cerebrospinal fluid leaks, or cochlear implants
d. PPSV23 recommended for adults younger than 65 years of age with chronic illness, functional or anatomic asplenia, immunocompromising conditions, organ or bone marrow transplant recipients; who are residents of nursing homes or long-term care facilities; or who smoke cigarettes

4. Rubella
   a. Recommended for all nonpregnant women of childbearing age who lack documented laboratory evidence of immunity or prior immunization after 12 months of age; documentation of provider-diagnosed rubella is not considered acceptable evidence of immunity
   b. Contraindications—pregnancy (advise not to become pregnant for four weeks after vaccination), known severe immuno-deficiency, individuals with HIV infection who are severely immunocompromised
c. May be given to breastfeeding women

5. Tetanus, diphtheria, and acellular pertussis (Td/Tdap)
   a. Recommended three-dose vaccination series including a Tdap dose for adults with unknown or incomplete history of primary Td vaccination
   b. Recommended one dose of Tdap for all adults who have not previously received Tdap
c. Recommended one dose of Tdap vaccine for pregnant women during each pregnancy regardless of number of years since prior Td or Tdap vaccination; preferred timing between 27 and 36 weeks’ gestation to offer optimal protection to infant in first few months of life when high risk exists for severe illness or death from pertussis
d. Booster Td vaccination every 10 years for adults

6. Varicella
   a. Recommended for all nonpregnant adolescents and adults without evidence of immunity; given in two doses four to eight weeks apart
   b. Evidence of immunity—documentation of two-dose vaccination; history of varicella based on diagnosis by healthcare provider, history of herpes zoster based on diagnosis of healthcare provider; laboratory evidence of immunity or confirmation of disease, U.S. born before 1980 except for pregnant women and healthcare personnel
c. Pregnant women should be assessed for evidence of immunity and, if not immune, give first dose of vaccine upon completion or termination of pregnancy and second dose four to eight weeks later
d. May be given to breastfeeding women
e. Contraindications—pregnancy (advise not to become pregnant for four weeks after vaccination), known severe immunodeficiency, individuals with HIV infection who are severely immunocompromised

7. Zoster (shingles)
   a. Recommended one-time dose for all individuals 60 years of age or older regardless of previous history of herpes zoster (shingles)
   b. Contraindications—pregnancy, known severe immunodeficiency, individuals with HIV infection who are severely immunocompromised

8. Hepatitis A
   a. Recommended for individuals who live in or are traveling to countries with high levels of hepatitis A infection, men who have sex with men, illicit drug users (injection or noninjection), those with occupational exposure risks, food handlers, and individuals with chronic liver disease or clotting factor disorders
   b. Two doses at least six months apart
   c. Combination hepatitis A and hepatitis B vaccine given in three doses, with second dose one month after first dose and third dose six months after first dose

9. Human papillomavirus (HPV)
   a. Bivalent HPV vaccine (2vHPV) targeting HPV types 16 and 18 responsible for 66% of cervical cancer, quadrivalent HPV vaccine (4vHPV) with added targets of types 6 and 11 causing most anogenital warts, and nine-valent HPV vaccine (9vHPV) targeting an additional five types protecting against 90% of HPV-associated cancers as well as most anogenital warts
   b. 2vHPV, 4vHPV or 9vHPV recommended as routine vaccination for females 11 to 12 years of age; may be given as young as 9 years of age.
   c. Recommended as a catch-up vaccination for females 13 to 26 years of age who did not receive it when younger
   d. For females younger than 15 years of age administer two doses, with second dose six to twelve months after the first dose
   e. For females 15 years of age and older administer three doses, with second dose two months after the first dose and third dose six months after the first dose. Individuals already infected with one or more HPV types will still get protection from types not yet acquired
   f. Routine pregnancy testing prior to initiation of HPV vaccination series is not recommended; if found to be pregnant after initiation, delay the remainder of the three-dose series until completion of pregnancy
   g. 4vHPV or 9vHPV recommended for males 11 to 12 years of age as routine vaccination, catch-up ages 13 to 21 years of age, and through age 26 for men who have sex with men
   h. Administer two-dose series for males younger than 15 years of age; administer three-dose series for males 15 years of age and older

10. Meningococcal
    a. Recommended initial vaccination age 11 to 12 as one-time dose
    b. Recommended booster vaccination at age 16; booster not needed if initial vaccination done at age 16 or older
    c. Recommended for all college freshmen living in dormitories, military recruits, individuals with anatomic or functional asplenia, individuals traveling to regions where meningococcal disease is common

11. Immunizations during pregnancy and lactation
    a. Live attenuated-virus vaccines should not be given during pregnancy—LAIV; varicella; zoster; measles, mumps, rubella (MMR)
    b. Varicella, zoster, and MMR may be given during lactation; IIv preferred over LAIV
    c. Inactivated virus vaccines, bacterial vaccines, toxoids, and tetanus immunoglobulin may be given if indicated

- Smoking cessation
  1. Overall, 14.8% of adult women currently smoke cigarettes (CDC, 2015)
  2. In women of reproductive age, 14.8% of 18 to 24 years of age and 17.2% of 25 to 44 years of age currently smoke cigarettes (CDC, 2015)
  3. Of female high school students, 9.7% currently smoke cigarettes (CDC, 2016c)
  4. E-cigarette use is a growing problem, especially among adolescents and young adults
  5. Smoking-cessation interventions should be individualized in relation to the smoker’s physical and psychological dependence and the stage of readiness for change
  6. Behavior-modification strategies—provide self-help materials and/or refer to a smoking-cessation class
  7. Five As of smoking cessation—Ask about tobacco use, Advise to quit, Assess willingness to attempt to quit, Assist in quit attempt, Arrange follow-up
  8. Pregnant women who smoke should be encouraged to attempt cessation using behavioral interventions before pharmacological approaches are used.
  9. Pharmacologic aids
    a. Nicotine replacement therapy (gum, patches, inhalers, nasal spray, lozenges)—helps to reduce the physical withdrawal symptoms and cravings that occur with smoking cessation
       (1) Major side effects—local skin reactions with patch; mouth and throat irritation with gum, lozenge, and inhaler; nasal irritation with spray; headache; dizziness; nausea
       (2) Contraindications—serious cardiac arrhythmias, severe angina, recent myocardial infarction, concurrent smoking, pregnancy
       (3) Avoid using for at least one hour before breastfeeding
       (4) Client education
          (a) Individual must stop smoking before initiating nicotine replacement therapy
          (a) Provide specific instructions for the chosen route of delivery
    b. Bupropion hydrochloride sustained-release tablets—reduces cravings that smokers experience; exact manner of action unknown; probably acts on brain pathways involved in nicotine addiction and withdrawal
       (1) Major side effects—inomnia, dry mouth, nausea, skin rash
       (2) Contraindications—seizure disorder, eating disorder, use of a monoamine oxidase (MAO) inhibitor, concomitant use of other forms of bupropion
Preconception Care

- Goals of preconception care
  1. Assistance in preventing unintended pregnancies
  2. Identification of risk factors that could affect reproductive outcomes
  3. Identification and management of medical conditions that could be affected by pregnancy or could affect reproductive outcomes (e.g., diabetes)
  4. Initiation of education and desired preventive interventions prior to conception

- Timing of preconception care—integrate into well-woman visits for all women of reproductive age

- Components of preconception care
  1. Assessment—family history, medical/surgical history, infectious disease history, obstetric history, environmental history, cultural health beliefs/practices, psychosocial history including violence, nutrition assessment, paternal health history
  2. Education/counseling and interventions

  a. Health promotion/disease prevention/risk reduction
     1. Rubella, varicella, hepatitis B, HPV, Td/Tdap, influenza vaccinations if needed
     2. Nutrition counseling for weight loss or gain as needed
     3. Smoking cessation
     4. Discontinuation of alcohol use
     5. Treatment for substance use disorders
     6. Limit environmental/occupational exposures that may be teratogenic
  
    7. Folic acid supplementation
    8. Optimal glucose control for diabetics
    9. Dietary management for phenylketonuria
    10. STI testing and treatment as indicated
    11. HIV counseling and testing as indicated
    12. Medication changes as needed to avoid teratogens such as some anti-seizure medications

b. Resources/referrals
   1. Genetic testing and counseling as indicated—repeated spontaneous abortions, ethnic background that is high risk for autosomal recessive disorder, previous infant with congenital anomaly, age 35 years or older
   2. Dietary counseling
   3. Substance use disorder treatment
   4. Domestic violence resources

- Transmission of genetic diseases
  1. Genetic testing—identifies changes in chromosomes, genes, or proteins
     a. Confirm or rule out suspected genetic conditions—commonly done as newborn screening, may be done during pregnancy
     b. Predictive gene testing—determine individual’s chance of developing a genetic disorder or passing on a genetic disorder

  2. Genes—basic unit of heredity passed from parents to offspring; consist of segment of DNA arranged along a chromosome; humans have about 23,000 genes

  3. Chromosomes—found in nucleus of cell; contains genes; normal human cell contains 46 chromosomes in pairs, 22 pairs are autosomes, and one pair is the sex chromosomes

  4. Karyotype—individual’s collection of chromosomes; also lab technique used to produce an image of an individual’s chromosomes and look for abnormal numbers or structures, for example, trisomy 21, or Down’s syndrome, in which individual has three copies of chromosome 21 instead of two copies

  5. Gene mutation—change in DNA sequence
     a. Somatic mutation—acquired; occurs after conception; DNA copying mistake during cell division or exposure to ionizing radiation, chemicals, or viruses during gestation or later in life
     b. Germ cell mutation—inherited; occurs during conception; present in egg or sperm cells of parent

  6. Genetic marker—DNA sequence with known physical location on a chromosome; can help link inherited disease with the responsible genes; several genetic markers are associated with increased risk of breast cancer

  7. Pattern of inheritance of genetic conditions caused by mutations in a single gene depends on the gene involved (see Table 2-2)
### Table 2-2 Inheritance Patterns

<table>
<thead>
<tr>
<th>Inheritance Pattern</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autosomal dominant</td>
<td>• Only 1 mutated copy of gene in each cell needed</td>
<td>Huntington disease, Neurofibromatosis</td>
</tr>
<tr>
<td></td>
<td>• Usually have one affected parent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Each offspring has 50% chance of inheriting abnormal gene and having condition and 50% chance of not being affected</td>
<td></td>
</tr>
<tr>
<td>Autosomal recessive</td>
<td>• Two mutated copies of gene present needed to have disease</td>
<td>Cystic fibrosis, sickle cell anemia</td>
</tr>
<tr>
<td></td>
<td>• Usually have unaffected parents (carriers—each has single copy of mutated gene)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• If both parents are carriers, offspring has 50% chance of being a carrier, 25% chance of having disease, 25% chance of being unaffected</td>
<td></td>
</tr>
<tr>
<td>X-linked dominant</td>
<td>• Mutation in genes on X chromosome</td>
<td>Fragile X syndrome</td>
</tr>
<tr>
<td></td>
<td>• Females more frequently affected than males</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Fathers cannot pass trait to sons</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• If mother is affected, both male and female offspring have 50% chance of inheriting the disorder</td>
<td></td>
</tr>
<tr>
<td>X-Linked Recessive</td>
<td>• Mutation in genes on X chromosome</td>
<td>Hemophilia</td>
</tr>
<tr>
<td></td>
<td>• Males more frequently affected than females</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Fathers cannot pass trait to sons</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Female offspring (XX) need to inherit affected X chromosome from both parents as carriers to have the condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Males (XY) need to inherit only the affected X chromosome from mother to have the condition</td>
<td></td>
</tr>
</tbody>
</table>

8. Other disorders may be caused by combination of effects of multiple genes or by interactions between genes and the environment—heart disease, diabetes, schizophrenia, certain types of cancer

### Parenting

- Infant–parent attachment—process by which parent and infant develop an affectionate, reciprocal relationship that endures over time
  1. Conditions promoting attachment
     a. Parental emotional well-being and ability to trust
     b. Social support system
     c. Competent level of communication and caregiving skills
     d. Proximity with the infant
  2. Risk factors for abuse or neglect
     a. Immaturity of parent(s)—adolescent parents at high risk
     b. Isolation/lack of support system
     c. Parent rejected or abused as child

### Questions

Select the best answer.

1. A 17-year-old client presents at the clinic with the following reason for seeking care. “I have been sick for three days. I feel sick to my stomach and have diarrhea.” Which of the following would be most appropriate to document as her reason for her visit/chief complaint?
   a. Flulike symptoms
   b. Gastrointestinal distress
   c. “I feel sick to my stomach and have diarrhea”
   d. Possible pregnancy, needs further evaluation

2. Which of the following would be considered a subjective assessment finding to be placed in the S section of SOAP format charting?
   a. Motile trichomonads
   b. Mucopurulent discharge
   c. Trichomoniasis vaginitis
   d. Vaginal itching

3. Which of the following includes a pertinent negative that needs to be documented?
   a. Sixteen-year-old female who has never been sexually active; no history of STIs
   b. Twenty-five-year-old female with abdominal pain; no nausea, vomiting, or diarrhea
   c. Forty-year-old female with depression; past history of suicidal attempt
   d. Sixty-year-old female with stress incontinence; no breast mass or nipple discharge
4. Appropriate information in the review of systems section of the health history would include:
   a. alert, cooperative, well groomed.
   b. had measles and chicken pox as a child.
   c. occasional loss of urine with coughing.
   d. walks 2 miles a day for exercise.
5. Which of the following would most appropriately be documented in the A section of SOAP charting format?
   a. CBC ordered
   b. Client states that she would like to quit smoking
   c. Medication instructions provided
   d. Mucopurulent cervicitis
6. The bell of the stethoscope should be used when listening for:
   a. bowel sounds.
   b. carotid bruits.
   c. lung sounds.
   d. S₁ and S₂ heart sounds.
7. Evaluation of extraocular muscle (EOM) movement includes:
   a. ophthalmoscopic examination.
   b. PERRLA evaluation.
   c. six cardinal fields of gaze.
   d. visual fields by confrontation.
8. The adventitious lung sound most commonly associated with chronic bronchitis is:
   a. crackles.
   b. pleural rub.
   c. rhonchi.
   d. wheezes.
9. When auscultating lung sounds, the normal finding over most of the lung fields is:
   a. bronchial.
   b. resonant.
   c. tympanic.
   d. vesicular.
10. Increased tactile fremitus would be an expected finding with:
    a. asthma.
    b. emphysema.
    c. lobar pneumonia.
    d. pleural effusion.
11. The sound heard over the cardiac area if there is pericarditis is mostly likely to be a(n):
    a. diastolic murmur.
    b. fixed split S₂.
    c. friction rub.
    d. increased S₁.
12. Which of the following is an abnormal abdominal examination finding in an adult?
    a. Abdominal aorta 2.5 cm in width
    b. Liver border nonpalpable
    c. Liver span 8 cm at the right MCL
    d. Splenic dullness at the left anterior axillary line
13. One of the cranial nerves for which you would test both motor and sensory function is:
    a. CN II—optic nerve.
    b. CN V—trigeminal nerve.
    c. CN VI—abducens nerve.
    d. CN XI—spinal accessory nerve.
14. A client with an Hgb of 10.2 g/dL and RBC indices indicating both microcytosis and hypochromia most likely has:
    a. folic acid deficiency.
    b. iron deficiency.
    c. severe dehydration.
    d. vitamin B₁₂ deficiency.
15. A client with an increased WBC count related to infectious hepatitis would most likely have an elevated level of:
    a. basophils.
    b. eosinophils.
    c. lymphocytes.
    d. neutrophils.
16. Expected thyroid function test findings with primary hypothyroidism include:
    a. decreased TSH and decreased FT₄.
    b. decreased TSH and increased FT₄.
    c. increased TSH and decreased FT₄.
    d. increased TSH and increased FT₄.
17. A pregnant woman presents with a recent-onset rash. Which of the following laboratory results would be reassuring that this is not likely rubella?
    a. HAI titer of 1:10 at her initial visit one month earlier
    b. HAI titer of 1:128 at the current visit
    c. Increased IgG antibody levels at the current visit
    d. Increased IgM antibody levels at the current visit
18. A client who had hepatitis B six months ago currently has no symptoms but has a positive test for HbsAg. This most likely indicates that she:
    a. has immunity to future infection.
    b. has persistent active infection.
    c. is a chronic carrier of hepatitis B.
    d. is in the early stage of reinfection.
19. A false-negative TB PPD test may be the result of:
    a. dormant infection.
    b. immunosuppression.
    c. intradermal injection.
    d. prior BCG vaccination.
20. An individual with cholecystitis would most likely have a(n):
    a. decreased alkaline phosphatase.
    b. decreased indirect bilirubin.
    c. increased albumin level.
    d. increased direct bilirubin.
21. Measuring waist circumference is most appropriate when the client’s BMI places her in which of the following categories?
    a. Underweight
    b. Normal weight
    c. Overweight
    d. Extreme obesity
22. Which of the following lab values is not normally affected by pregnancy?
    a. Cholesterol
    b. Mean corpuscular volume (MCV)
    c. Total thyroxine (T₄)
    d. Triglycerides
23. HPV testing is indicated for a(n):
    a. 18-year-old female whose sex partner has a history of genital warts.
    b. 24-year-old female with current genital warts as adjunct to routine Pap test.
A laboratory test finding of increased immature neutrophils (shift to normal size uterus and normal size ovaries.

24. Appropriate management for a 45-year-old white woman who has no diabetes risk factors and no symptoms of diabetes with a fasting glucose of 130 mg/dL would include which of the following?
   a. Inform client she has impaired glucose tolerance
   b. Order HbA1c level
   c. Repeat glucose testing on another day
   d. Repeat glucose screening in three years

25. A pregnant female who received a Tdap vaccination postpartum with her last pregnancy three years ago should have:
   a. Td booster in the first or second trimester.
   b. Td booster in seven years.
   c. Tdap vaccination between 27 and 36 weeks’ gestation.
   d. Tdap vaccination at six to eight weeks postpartum.

26. Tests for cerebellar function include:
   a. deep tendon reflex evaluation.
   b. short-term memory evaluation.
   c. discriminatory sensation tests.
   d. Romberg test for balance.

27. Which of the following statements is correct regarding autosomal recessive inheritance of a genetic disorder?
   a. Both parents are unaffected but are carriers of the mutated gene.
   b. Disorder tends to occur in every generation of the affected family.
   c. Male offspring are more likely to be affected than females.
   d. One parent has the genetic disorder with the mutated gene.

28. Client education concerning the use of bupropion hydrochloride for smoking cessation should include:
   a. discontinue smoking prior to initiation of this medication.
   b. the medication should not be used for more than eight weeks.
   c. initiate the medication at least one week prior to smoking cessation.
   d. side effects may include drowsiness and weight gain.

29. Which of the following statements regarding influenza vaccination during pregnancy is true?
   a. Influenza vaccination should be given only if the woman has health problems that place her at high risk for complications with influenza.
   b. Influenza vaccination may be safely given in any trimester of pregnancy.
   c. Intranasal influenza vaccine is recommended for pregnant women to reduce chances of side effects.
   d. Influenza vaccination is contraindicated during pregnancy.

30. Which of the following heart sounds may be a normal finding for a woman in the third trimester of pregnancy?
   a. Diastolic murmur
   b. Fixed split S2
   c. S3
   d. S4

31. Pelvic findings on examination of a 22-year-old nulliparous woman are uterus 7 cm in length and ovaries 3 cm × 2 cm × 1 cm. These findings are consistent with:
   a. enlarged uterus and enlarged ovaries.
   b. normal size uterus and enlarged ovaries.
   c. enlarged uterus and normal size ovaries.
   d. normal size uterus and normal size ovaries.

32. A laboratory test finding of increased immature neutrophils (shift to normal size uterus and normal size ovaries.

33. An elderly woman has had gastroenteritis with vomiting and diarrhea for the past three days. Her mucous membranes appear dry, and she says she has not urinated yet today. Expected laboratory test findings related directly to her current condition might include:
   a. decreased urine specific gravity.
   b. decreased hematocrit.
   c. increased blood glucose.
   d. increased blood urea nitrogen.

34. The blood type in which an individual has no antigens on his or her RBCs is:
   a. AB+.
   b. AB–.
   c. O+.
   d. O–.

35. The heart sound heard best at the base of the heart is:
   a. S1.
   b. S2.
   c. S3.
   d. S4.

36. The second and third doses of the human papillomavirus (HPV) vaccination should be given:
   a. one month and three months after the initial dose.
   b. one month and six months after the initial dose.
   c. two months and six months after the initial dose.
   d. three months and 12 months after the initial dose.

37. An abnormal finding on ophthalmoscopic examination would be:
   a. arterioles smaller than veins.
   b. optic disc that is yellow.
   c. presence of a red reflex.
   d. tapering of the veins.

38. When examining the cervix of a 20-year-old female, you note that most of the cervix is pink, but there is a small ring of dark-red tissue surrounding the os. This is most likely:
   a. an endocervical polyp.
   b. due to cervical dysplasia.
   c. due to cervical infection.
   d. the squamocolumnar junction.

39. The laboratory test that is done for definitive diagnosis of sickle cell disease is:
   a. Hgb electrophoresis.
   b. peripheral blood smear.
   c. RBC indices.
   d. sickle cell preparation.

40. A woman who is currently pregnant, has had two full-term deliveries, and has had one first-trimester abortion would be considered:
   a. gravida 2 para 2.
   b. gravida 3 para 2.
   c. gravida 3 para 3.
   d. gravida 4 para 2.

41. The best position for palpating the axilla is with the woman:
   a. lying down with her arm above the head on the side you are examining.
b. lying down with her arm at her side on the side you are examining.
c. sitting up with her arm raised above her head on the side you are examining.
d. sitting up with her arm down on the side you are examining.

42. Which of the following would be considered a positive PPD result?
   a. General population—5 mm induration
   b. General population—10 mm induration
   c. Moderate-risk population—5 mm induration
   d. High-risk population—5 mm induration

43. Abnormal findings on a urinalysis would include:
   a. pH 5.0.
   b. specific gravity 1.5.
   c. WBCs 3 per HPF.
   d. protein 4 mg/dL.

44. Which of the following types of vaccines should not be given during pregnancy?
   a. Bacterial vaccines
   b. Inactivated virus vaccines
   c. Live attenuated virus vaccines
   d. Immunoglobulins

45. USPSTF recommendations for routine breast cancer screening include:
   a. biennial mammograms starting at age 50.
   b. breast self-examination starting at age 21.
   c. clinical breast examination annually starting at age 30.
   d. discontinue mammograms after age 65.

46. Good dietary sources for folic acid include:
   a. chicken.
   b. dried beans.
   c. egg yolks.
   d. milk.

47. The glands located posteriorly on each side of the vaginal orifice are the:
   a. Bartholin's glands.
   b. Bulbar glands.
   c. Nabothian glands.
   d. Skene's glands.

48. Which of the following statements regarding gene mutations is correct?
   a. All gene mutations occur at the time of conception.
   b. Germ cell mutations occur after conception.
   c. Germ cell mutations may occur as a result of exposure to radiation.
   d. Somatic mutations may occur any time in a person's life.

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**Answers with Rationales**

1. c. "I feel sick to my stomach and have diarrhea"
   In the health history, the reason for a patient's visit/chief complaint should be documented as a brief statement in the client's own words.

2. d. Vaginal itching
   Subjective information is obtained as part of the health history and is what the client or caregiver tells you.

3. b. Twenty-five-year-old female with abdominal pain; no nausea, vomiting, or diarrhea
   The description of presenting symptoms should include pertinent negatives. When a symptom suggests that an abnormality may exist or may develop in that area, include documentation of absence of symptoms that may help eliminate some of the possibilities.

4. c. occasional loss of urine with coughing.
   The review of systems is used to assess common symptoms for each major body system to avoid missing any potential or existing problems.

5. d. Mucopurulent cervicitis
   The A section of SOAP charting format is your diagnosis or prioritized list of problems determined from your assessment of subjective and objective data.

6. b. carotid bruits.
   The bell of the stethoscope is best for listening to low-pitched sounds such as those heard over large blood vessels.

7. c. six cardinal fields of gaze.
   Extraocular muscle (EOM) function is evaluated by assessing symmetry, lid lag, and nystagmus as the client holds her head still and follows your finger through the six cardinal fields of gaze.

8. c. rhonchi.
   Rhonchi are low-pitched, snoring-quality adventitious lung sounds that may be heard when air passes over thick secretions in the large airways found in conditions such as chronic bronchitis.

9. d. vesicular.
   The lung sound over most of the lung fields is vesicular, with inspiratory sounds lasting longer than expiratory sounds.

10. c. lobar pneumonia.
    Tactile fremitus refers to the palpable transmission of vibrations through the bronchus to the chest wall when the client is speaking. There is increased transmission through consolidated tissue, as is found with lobar pneumonia.

11. c. friction rub.
    A pericardial friction rub may be heard over the cardiac area as a grating sound throughout the cardiac cycle when there is inflammation of the pericardium.

12. d. Splenic dullness at the left anterior axillary line
    Splenic dullness may be percussed at the sixth to tenth intercostal space just posterior to the midaxillary line on the left side with the client in the supine position. Splenic dullness at the anterior axillary line is indicative of an enlarged spleen.

13. b. CN V—trigeminal nerve.
    The cranial nerves with both motor and sensory functions are CN V trigeminal nerve, CN VII facial nerve, CN IX glossopharyngeal, and CN X vagus. Routinely, the only cranial nerve in which you test both motor and sensory function is CN V.

14. b. iron deficiency.
    Red blood cell indices provide information about size, weight, and Hgb concentration of RBCs and are useful in classifying anemia when the individual has a low Hgb level. Iron-deficiency anemia is characterized by abnormally small (microcytic) and pale (hypochromic) RBCs.

15. c. lymphocytes.
    The WBC count with differential provides information useful in evaluating the individual with infection, neoplasm, allergy, or immunosuppression. Lymphocytes and monocytes are increased with acute viral infections and chronic bacterial infections.
16. c. increased TSH and decreased FT₄.  
An increased thyroid-stimulating hormone (TSH) level is seen with primary hypothyroidism and thyroiditis. A decreased free thyroxine (FT₄) is seen with hypothyroidism.

17. a. HAI titer of 1:10 at her initial visit one month earlier  
The hemagglutination inhibition (HAI) test is used to detect immunity to rubella and to diagnose rubella infection. Titters of 1:10 or greater indicate immunity to rubella. High titers (1:64 or greater) may indicate current rubella infection.

b. is a chronic carrier of hepatitis B.  
Hepatitis B surface antigen (HBsAg) rises before onset of clinical symptoms, peaks during the first week of symptoms, and returns to normal by the time jaundice subsides. An individual is considered to be a carrier (remains infectious) if HBsAg persists.

18. c. increased TSH and decreased FT₄.  
Primary hypothyroidism and thyroiditis. An individual is considered to be a carrier (remains infectious) if HBsAg persists.

19. b. Overweight  
False-negative TB PPD tests may result from incorrect administration (must be intradermal) or immunosuppression.

d. increased direct bilirubin.  
An elevated direct (conjugated) bilirubin level occurs with gallstones and obstruction of the extrahepatic duct.

20. c. Overweight  
Waist circumference provides measurement of abdominal fat as an independent prediction of risk for type 2 diabetes, dyslipidemia, hypertension, and cardiovascular disease in individuals with body mass index (BMI) between 25 and 39.9 (overweight and obesity). Waist circumference has little added value in disease risk prediction in individuals with BMI of 40 or greater (obesity extreme).

21. b. Mean corpuscular volume (MCV)  
Cholesterol and triglyceride levels may be elevated during pregnancy. Total thyroxine (T₄) levels are affected by the amount of thyroxine-binding globulin (TBG), which is increased during pregnancy. The MCV is the average volume or size of a single RBC. Although Hgb/Hct may be lower during pregnancy, the size of the RBCs should not change unless the woman has iron deficiency anemia, thalassemia, vitamin B₁₂ deficiency, or folic acid deficiency.

22. c. 30-year-old female with no history of genital warts as adjunct to routine Pap test.  
ACOG and ACS recommend screening women age 30 to 65 years with combination Pap test and HPV test every five years. Screening in this age group with Pap test alone every three years is also acceptable.

23. c. 30-year-old female with no history of genital warts as adjunct to routine Pap test.  
ACOG and ACS recommend screening women age 30 to 65 years with combination Pap test and HPV test every five years. Screening in this age group with Pap test alone every three years is also acceptable.

24. c. repeat glucose testing on another day  
A fasting glucose of 126 mg/dL or greater is diagnostic of diabetes in individual. Repeat testing should be done on a subsequent day to confirm the diagnosis.

25. c. Tdap vaccination between 27 and 36 weeks’ gestation.  
One dose of Tdap vaccine is recommended during each pregnancy. The preferred timing is between 27 and 36 weeks to offer optimal protection to the infant in the first few months of life when it is at high risk for severe illness or death from pertussis.

The cerebellum coordinates motor activity, maintains equilibrium, and helps to control posture.

27. a. Both parents are unaffected but are carriers of the mutated gene.  
In autosomal recessive inheritance of a genetic disorder, the affected individual has two mutated copies of the responsible gene in each cell. The affected individual usually has unaffected parents (carriers) who each carry a single copy of the mutated gene.

28. c. initiate the medication at least one week prior to smoking cessation.  
Individuals should initiate bupropion hydrochloride sustained-release tablets one to two weeks before they stop smoking. This medication reduces cravings that smokers experience.

29. b. Influenza vaccination may be safely given in any trimester of pregnancy.  
Administration of inactivated influenza vaccine (IIV) is recommended for all women who will be in the second or third trimester of pregnancy during the influenza season. IIV is considered safe at any stage in pregnancy and during lactation. Live attenuated influenza vaccine (LAIV) given intranasally is contraindicated in pregnancy.

30. c. S₂  
An increased S₂ may be audible in late pregnancy. This heart sound is heard early in diastole during rapid ventricular filling.

31. d. normal size uterus and normal size ovaries.  
The uterus is 5.5 to 8 cm long and pear shaped in the nulliparous woman. During the reproductive years, the ovaries are approximately 3 cm × 2 cm × 1 cm.

32. a. acute bacterial infection.  
Neutrophils are increased with acute bacterial infections and trauma. Increased immature neutrophil forms (band or stab cells), referred to as a “shift to the left,” are seen with ongoing acute bacterial infection.

33. d. increased blood urea nitrogen.  
Blood urea nitrogen (BUN) is an indirect measure of renal and liver function. Increased levels may be seen with hypovolemia, dehydration, reduced cardiac function, gastrointestinal bleeding, starvation, sepsis, and renal disease.

34. d. O−.  
Blood types are grouped according to presence or absence of antigens A, B, and Rh on RBCs. Blood type O negative has no antigens on RBCs.

35. b. S₂.  
The S₂ heart sound is heard best at the base of the heart using the diaphragm of the stethoscope.

36. c. two months and six months after the initial dose.  
The recommended schedule for the three-series HPV vaccination is initial dose, second dose two months after the initial dose, and third dose six months after the initial dose.

37. d. tapering of the veins.  
The normal retinal artery wall is transparent except for the column of blood going down the middle, so a vein crossing beneath the artery can be seen up to the column of blood on either side (arteriovenous crossing). When there is narrowing of the retinal artery (as with hypertension) the arterial wall thickens and becomes less transparent. The vein crossing under the narrowed artery appears to taper down on either side of the artery.

38. d. the squamocolumnar junction.  
The squamocolumnar junction is the area where squamous epithelium (pink) and columnar epithelium (dark red) of the cervix meet. The junction may be inside the cervical os so that only squamous epithelium is visible, or a ring of columnar tissue may be visible to a varying extent around the os.

The sickle cell preparation is used to screen for sickle cell disease and trait. A positive test indicates the presence of Hgb S, indicating either sickle cell disease or trait. The Hgb electrophoresis is the definitive test performed if the screening test is positive. It identifies Hgb type and quantity.
40. Gravida denotes the total number of pregnancies, including a current pregnancy. Para denotes total number of pregnancies reaching 20 weeks or longer gestation.

41. Sitting up with her arm down on the side you are examining. Palpate the axillary lymph nodes and breast tissue that extends into the axillary area (tail of Spence) with the woman sitting with arms relaxed at her side. The examiner supports the lower arm and uses the palmar surface of fingers to palpate the entire area.

42. High-risk population—5 mm induration

In the individual considered to be high risk for tuberculosis, a PPD skin test resulting in a 5-mm or greater area of induration is a positive reaction.

43. Specific gravity 1.5.

Normal values are as follows: specific gravity 1.005 to 1.030, pH 4.6 to 8.0, WBCs 0 to 4 per high-power field (HPF), and protein 0 to 8 mg/dL.

44. Live attenuated virus vaccines

Live attenuated viruses virus vaccines are contraindicated during pregnancy. Rubella, measles, mumps, varicella, zoster, and the intranasal form of influenza vaccine (LAIV) are all live attenuated viruses.

45. Biennial mammograms starting at age 50

The USPSTF recommends biennial mammograms for women age 50 to 74 years of age (Grade B Recommendation).

46. Dried beans.

Dried beans, leafy green vegetables, citrus fruits and juices, and fortified cereals are good dietary sources of folic acid.

47. Bartholin’s glands.

The glands located posteriorly on each side of the vaginal orifice are the Bartholin’s glands.

48. Somatic mutations may occur anytime in a person’s life.

Somatic mutations are acquired and occur after conception. A DNA copying mistake may occur during cell division or from exposure to ionizing radiation, chemicals, or viruses during gestation or later in life.

Bibliography


Pharmacokinetics (Study of How the Body Processes Drugs)

- **Absorption**
  1. Movement of drug from site of entry into the systemic circulation
  2. Bioavailability—percentage of active drug that is absorbed and available at the target tissue
  3. Affected by cell membranes, blood flow, drug solubility, pH of drug, variables related to the gastrointestinal tract, drug concentration, dosage form, route of administration

- **Distribution**
  1. Movement of drug into body fluids and body tissues
  2. Affected by permeability of capillaries and tissues, systemic circulation, size of drug molecule, affinity for lipid and aqueous tissues, protein binding, and pH
  3. Plasma protein binding—drugs may attach to proteins (mainly albumin) in the blood; only unbound drug is active; as free drug is excreted, more of drug is released from binding to replace what is lost; competition for binding sites by different drugs and hypoalbuminemia can affect amount of free drug that is available
  4. Blood–brain barrier affects drug distribution—endothelial cells of capillaries surrounding brain are packed tightly together, which limits passive transport from blood into cerebral tissue; drug must be highly lipophilic to pass into brain
  5. Placental barrier affects drug distribution
     a. Several layers of placental tissue separate maternal and fetal circulation, so the placenta is not an absolute barrier to drugs; almost all drugs taken by mother pass through placenta to fetus to some degree, and they reach steady state levels in fetus between 50% to 100% of maternal concentration
     b. General determinants of drug transfer across placenta include lipid solubility, extent of plasma protein binding, and degree of ionization of weak acids and bases

- **Excretion**
  1. Removal of drug from body via the kidneys, intestines, sweat and salivary glands, lungs, or mammary glands
  2. Urinary excretion—net effect of glomerular filtration, active tubular secretion, and partial reabsorption
  3. Enterohepatic recirculation—some fat-soluble drugs may be reabsorbed into the bloodstream from the intestines and returned to the liver

- **Metabolism**
  1. Chemical inactivation of drug by conversion to a more water-soluble compound (metabolite) that can be excreted from the body
  2. Chemical alterations are produced by microsomal enzymes mainly in the liver
  3. Hepatic first-pass effect—orally administered drug goes from GI tract through portal system to liver before going to the general circulation; some metabolism of drug may occur as it is taken up by hepatic microsomal enzymes
  4. Drug interactions can affect metabolism by enzyme induction or inhibition
  5. Variation in drug metabolism may be affected by genetics, age, pregnancy, liver disease, diet, alcohol, circadian rhythm
  6. Prodrugs—drugs that must be metabolized to become effective (active metabolites); developed to improve stability, increase absorption, or prolong duration of drug activity; that is, valacyclovir is not effective, but its active metabolite, acyclovir, is

- **Steady state**—when rate of drug elimination equals rate of drug availability (absorption)
- **Half-life**—time it takes for plasma concentration of a drug to be reduced by 50%; used to determine time required to reach steady state and dosage interval
- **Volume of distribution**—apparent volume in which drug is dissolved; relates to concentration of drug in plasma and the amount in the body; may be used to calculate loading dose needed to achieve a desired steady state drug level immediately
Pharmacodynamics (Study of Mechanism of Drug Action on Living Tissue)

- Drug effects produced by
  1. Drug-receptor interaction
  2. Drug-enzyme interaction
  3. Nonspecific drug interaction
- Drug receptors—cellular protein, enzyme, or membrane that, when bound to a drug, initiates a physiologic response or blocks a response that receptor normally stimulates
  1. Agonist—drug combines with receptor to stimulate a response
  2. Antagonist—drug interferes with receptor action or with other drug agonists present
- Drug–response relationship—study of relationship between concentration of drug in circulation and response obtained
  1. Affinity—propensity of a drug to bind itself to a given receptor site
  2. Efficacy—ability to initiate biologic activity as a result of such binding
- Therapeutic effect
  1. All pharmacologic responses have a maximum effect at which no further response is achieved, regardless of drug concentration
  2. Therapeutic range (window)—plasma concentration of drug that produces desired action without toxic effects
  3. Therapeutic index (TI)—ratio of lethal doses in 50% of population over the median minimum effective dose in 50% of the population; higher TI = safer drug

Adverse Reactions—Unintended, Undesired Effects of Drug

- Predictable—may occur related to
  1. Age
  2. Body mass
  3. Gender
  4. Pathologic state
  5. Circadian rhythm
  6. Genetic factors
  7. Psychological factors
- Unpredictable types include:
  1. Drug allergy
  2. Idiosyncrasy
  3. Tolerance
  4. Drug dependence
- Iatrogenic responses include:
  1. Blood dyscrasias
  2. Hepatic toxicity
  3. Renal damage
  4. Teratogenic effects
  5. Dermatologic effects

Drug Interactions

- Modification of an expected drug response due to exposure to another drug or substance at approximately the same time; may be pharmacokinetic or pharmacodynamic
  - Pharmacokinetic—inhibition of absorption, enzyme inhibition, or induction that increases risk for drug toxicity or results in reduced drug effect, altered renal elimination
  - Pharmacodynamic—additive if two drugs have similar pharmacodynamic effects, antagonistic if two drugs have opposing pharmacodynamics effects
  - Drug–food interactions may decrease bioavailability by interfering with absorption; they may increase bioavailability via inhibition of enzymatic activity in intestinal wall
  - Drug–herb interactions may decrease or increase bioavailability of drug

Drug Contraindications

- Allergies, medical conditions, concurrent use of another drug, age, pregnancy, lactation may be drug contraindications
- FDA Pregnancy and Lactation Labeling Rule (PLLR) (Food and Drug Administration, 2014)
  1. Assists in assessing benefits versus risks of a drug for pregnant women and nursing mothers
  2. Includes subsections for pregnancy, lactation, and females and males of reproductive potential in the Use in Special Populations section.
  3. Pregnancy letter categories (A, B, C, D, X) have been removed
  4. Pregnancy subsection—contact information for pregnancy exposure registry for drug if available, risk summary, clinical considerations, available human and animal data
  5. Lactation subsection—risk summary, applicable clinical considerations, available human and animal data
Pharmacotherapy (Applying Knowledge of Benefits and Risks of Drug Therapy to Individual Care)

- Effects of age
- Gender differences in drug metabolism
- Health status
- Family history and genetic factors
- Lifestyle behaviors
- Polypharmacy
- Drug regimen adherence

Client Education

- Purpose of drug, mechanism of action, effectiveness
- Benefits and risks
- Dosage and administration
- Major side effects/adverse reactions
- Plan for follow-up

Selected Drug Review

- Metronidazole
  1. Class: nitroimidazole
  2. Indications for use include but are not limited to treatment of:
     a. Trichomonas vaginalis
     b. Bacterial vaginosis
     c. Pelvic inflammatory disease (PID), in combination with other antibiotics
     d. Pseudomembranous colitis caused by clostridium difficile
     e. Gastric or peptic ulcer associated with Helicobacter pylori
  3. Pharmacokinetics
     a. Absorption and distribution
        (1) Oral route—excellent, bioavailability at least 90%
        (2) Intravaginal route—absorbed systemically; peak serum concentrations are < 2% of levels achieved with oral doses
        (3) Widely distributed throughout body tissues and fluids

- Fluconazole
  1. Class: triazole
  2. Indications for use include but are not limited to treatment of:
     a. Candidiasis—oral, esophageal, vulvovaginal
     b. Fungal meningitis—cryptococcosis, candida species, histoplasmosis

6. Females and males of reproductive potential subsection—included if human or animal study data show potential drug-associated effects on fertility and/or implantation loss

- Lactation and drugs
  1. Properties of drug that determine how much of drug will be in breastmilk include pH, protein binding, liposolubility, and molecular weight
  2. Infant pharmacokinetics have influence—drug metabolism variables such as gastric acid production, liver function, amount of body fat, renal excretion

(4) Crosses placenta and enters breastmilk
(5) Mean elimination half-life is 8 hours
b. Metabolism—mostly in liver
c. Excretion—mostly through urine, some fecal excretion

4. Pharmacodynamics
   a. Disrupts DNA and protein synthesis of susceptible organisms
   b. Amebicidal, bactericidal, antiprotozoal
   c. Selectivity for anaerobic bacteria

5. Adverse reactions
   a. More common with oral than vaginal route
   b. GI—nausea, vomiting, dry mouth, metallic taste, anorexia, abdominal cramping
   c. Headache
   d. Hypersensitivity
   e. Mild leukopenia or neutropenia—not persistent after treatment
   f. Peripheral neuropathy—high doses, prolonged use
   g. Seizures—high doses, prolonged use

6. Drug interactions
   a. Disulfram—acute psychosis and confusion if metronidazole taken within 2 weeks of taking disulfram
   b. Alcohol (including medications with significant alcohol content)—may cause nausea/vomiting, headache, flushing, abdominal cramps
   c. Warfarin—metronidazole can potentiate action
   d. Cimetidine—can decrease hepatic metabolism of metronidazole and increase serum levels
   e. Phenobarbital/phenytoin—can increase hepatic metabolism of metronidazole, clinical significance uncertain

7. Contraindications/precautions
   a. Hypersensitivity
   b. History of drug-induced hematological dyscrasias
   c. Hematological disease
   d. Severe hepatic disease/impairment
   e. Renal impairment/renal failure
   f. Preexisting seizure disorder

8. Use in pregnancy and lactation
   a. Considered safe in all trimesters of pregnancy
   b. Interrupt nursing for 12–24 hours after drug dose to allow excretion of drug

9. Client education
   a. Take with food to decrease GI irritation
   b. Avoid alcohol and alcohol-containing substances during and for 48 hours after last dose
   c. Chew gum or suck on ice or hard candy to help reduce dry mouth and metallic taste
   d. May cause darkening of urine
   e. Report any central nervous system (CNS) symptoms
   f. If taking for trichomoniasis, refrain from sex until self and partner treatment is complete

• Fluconazole
  1. Class: triazole
  2. Indications for use include but are not limited to treatment of:
     a. Candidiasis—oral, esophageal, vulvovaginal
     b. Fungal meningitis—cryptococcosis, candida species, histoplasmosis
3. Pharmacokinetics
   a. Absorption and distribution
      (1) Rapidly absorbed in GI tract, bioavailability over 90%
      (2) Widely distributed in body tissues and fluids
      (3) Vaginal secretion, saliva, and sputum concentrations about 10 times that of plasma concentrations
      (4) Distribution in breastmilk and across placenta unknown
      (5) Mean elimination half-life is 30 hours
   b. Metabolism—liver via interaction with CYP450 enzyme system, no first-pass metabolism
   c. Excretion—majority through urine (60–80%) as unchanged drug
4. Pharmacodynamics
   a. Highly selective inhibitor of fungal CYP450 enzymes
   b. Alters fungal cell membrane function and cell wall synthesis
   c. Broad spectrum of antifungal activity
   d. Emerging resistance of non–candida albican species
5. Adverse reactions
   a. Headache
   b. GI effects—nausea, abdominal pain
6. Drug interactions
   a. Cisapride (Propulsid)—prolonged QT interval
   b. Cyclosporin—nephrotoxicity
   c. Carbamazepine (Tegretol)—increased carbamazepine levels, decreased fluconazole levels
   d. Phenytoin (Dilantin)—nystagmus, ataxia
   e. Sulfanylureas—hypoglycemic reactions
   f. Theophylline—increased theophylline levels
   g. Warfarin—increased warfarin levels
7. Contraindications/precautions
   a. History of heart arrhythmia
   b. Hepatic disease
   c. Renal impairment/renal failure
   d. Hypersensitivity
   e. Multiple drug interactions
8. Use in pregnancy and lactation
   a. Available human data do not suggest increased risk of congenital anomalies following a single maternal dose of 150 mg
   b. Recommended treatment for vulvovaginal candidiasis in pregnancy is topical azole for 7 days
   c. Distributed in breastmilk at concentrations similar to those in plasma
   d. Considered compatible with breastfeeding
9. Client education
   a. Symptoms should start to go away about 24 hours after taking medication
   b. It may take several days for symptoms to go away completely
   c. Notify provider of all medications because several drug interactions are possible
   d. Avoid overuse/unnecessary use of antibiotics

• Acyclovir
  1. Class: nucleoside analog
  2. Indications for use include treatment of:
     a. Herpes simplex
     b. Herpes genitalia
     c. Herpes zoster
     d. Varicella
3. Pharmacokinetics (oral)
   a. Absorption and distribution
      (1) Poorly absorbed, 15–20% bioavailability; however, therapeutic levels achieved
      (2) Widely distributed
      (3) Crosses placenta and enters breastmilk
      (4) Mean elimination half-life—3–4 hours
   b. Metabolism—mostly in liver
   c. Excretion—90% in urine as unchanged drug
4. Pharmacodynamics
   a. Selectively activated in infected cells
   b. Inhibits viral DNA synthesis
   c. Only effective against rapidly replicating herpes virus
   d. Does not eliminate latent herpes virus
5. Adverse reactions
   a. GI effects—nausea/vomiting, diarrhea
   b. Headache
   c. Skin rash
   d. Acute renal failure—rare with oral route
6. Drug interactions—increased risk for renal toxicity with nephrotoxic drugs
7. Contraindications/precautions—renal or hepatic function impairment
8. Use in pregnancy and lactation
   a. Acyclovir registry has not found any increase in birth defects in pregnant women who use this drug
   b. May use to treat first episode of genital herpes or severe recurrent herpes
   c. May consider treatment in late pregnancy to reduce frequency of recurrences at term
   d. Lactation—use if indicated; some excretion in breastmilk
9. Client education
   a. Take with full glass of water
   b. Space doses evenly
   c. Start at first sign of recurrent episode
   d. Additional education for suppressive regimens
10. Other nucleoside analogs—same indications, mechanism of action, adverse reactions, contraindications/precautions
    a. Famcyclovir—converted to active form via first-pass metabolism, better bioavailability
    b. Valacyclovir—prodrug converted to acyclovir, better bioavailability, less frequent dosing

• Alendronate
  1. Class: bisphosphonate
  2. Indications for use include:
     a. Prevention of osteoporosis in postmenopausal women
     b. Treatment of osteoporosis postmenopausal women
     c. Treatment of osteoporosis in men
     d. Treatment of glucocorticoid-induced osteoporosis
     e. Treatment of Paget’s disease of the bone
3. Pharmacokinetics
   a. Absorption and distribution
      (1) Reaches maximum concentration in bone at 3 to 6 months
      (2) Systemic bioavailability is low with little exposure to tissues other than bone
      (3) Bioavailability reduced by 40% when taken with food and 60% when taken with coffee or orange juice
      (4) Approximately 50% of oral dose binds to exposed bone surface
      (5) Estimated elimination half-life from bone—greater than 10 years
   b. Metabolism—high affinity for bone; no evidence of metabolism in liver
   c. Excretion—50% of dose that remains after it binds to bone is excreted unchanged in urine
4. Pharmacodynamics
   a. Reduces bone resorption by inhibiting activity of osteoclasts
   b. No direct effect on bone formation
5. Adverse reactions
   a. Local irritation of the upper gastrointestinal mucosa
   b. Esophagitis, esophageal ulcers, and esophageal erosions
   c. Hypocalcemia
   d. Severe and occasionally incapacitating bone, joint, and/or muscle pain
   e. Osteonecrosis of the jaw—more likely with intravenous administered bisphosphonate and generally associated with dental work
   f. Low impact fractures of femoral shaft—rare, more common in long-term users
   g. Hypersensitivity reactions
6. Drug interactions—Calcium and magnesium- or aluminum-containing antacids likely to reduce absorption of alendronate if taken at same time
7. Contraindications/precautions
   a. Abnormalities of esophagus that delay esophageal emptying
   b. Inability to stand or sit upright for at least 30 minutes after taking alendronate
   c. Hypocalcemia
   d. Renal impairment
   e. Hypersensitivity
8. Use in pregnancy and lactation
   a. No well-designed studies of use during pregnancy in humans; small studies and case reports have shown no increase in rate of birth defects or long-term health concerns
   b. Limited evidence indicates that breastfeeding after cessation of long-term bisphosphonate treatment appears to have no adverse effects on infant
   c. No data available on use during breastfeeding; poorly absorbed by mother so amount in breastmilk likely small
9. Client education
   a. Take in the morning with 8 ounces of plain water
   b. Do not eat food, drink fluids, or take other medications for at least 30 to 60 minutes
   c. Remain upright for at least 30 to 60 minutes
   d. Take at least 2 hours before any calcium supplement or antacids

- Oxybutynin
  1. Class: antimuscarinic anticholinergic
  2. Indications for use—treatment of women with overactive bladder
  3. Pharmacokinetics
     a. Absorption and distribution
        (1) Rapid; reaches maximum concentration within an hour
        (2) Bioavailability about 6%
        (3) Widely distributed in body tissues
        (4) Mean elimination half-life is 2–3 hours
     b. Metabolism—liver via interaction with CYP3A4 enzyme
     c. Excretion—extensively metabolized in liver with less than 0.1% of dose excreted unchanged in urine

4. Pharmacodynamics
   a. Targets M₁ and M₃ receptors to reduce muscarinic action of acetylcholine on smooth muscle
   b. Mild antispasmodic—increases bladder capacity, diminishes frequency of uninhibited contractions of detrusor muscle

5. Adverse reactions
   a. Systemic anticholinergic side effects, for example, dry mouth, blurred vision, constipation, tachycardia, urinary retention, drowsiness, impaired sweating, confusion, are common reasons for discontinuation
   b. Transdermal patch may decrease serum levels of active metabolite and reduce anticholinergic side effects
   c. Heatstroke in hot climates if sweating is impaired
6. Drug interactions
   a. Inhibitors of CYP3A4 enzyme may cause increased plasma concentrations of oxybutynin
   b. May enhance effects of other anticholinergic drugs
   c. May enhance sedative effects of opioids or other sedation-causing agents
7. Contraindications/precautions
   a. Hypersensitivity
   b. Uncontrolled narrow-angle glaucoma
   c. Gastric retention
   d. Urinary retention
   e. Concomitant use of other anticholinergic drugs
   f. Esophageal disease
   g. Hepatic or renal impairment
   h. Myasthenia gravis
   i. Cardiac disease
   j. Hypertension
8. Use in pregnancy and lactation
   a. No evidence of impaired fertility or harm to animal fetus; safety in pregnant women has not been established
   b. It is not known if oxybutynin is excreted in breastmilk
9. Client education
   a. Take with full glass of water at same time each day
   b. May take with or without food
   c. Avoid becoming overheated or dehydrated during exercise or in hot weather
• Atorvastatin
  1. Class: HMG CoA Reductase Inhibitor—statin
2. Indications for use—first-line treatment in reducing low density lipoprotein (LDL) levels

3. Pharmacokinetics
   a. Absorption and distribution
      (1) Rapid, maximum plasma concentrations within 1–2 hours
      (2) Low systemic bioavailability of about 14% due to extensive first-pass metabolism, a benefit as liver is target organ for drug
      (3) Animal studies show drug crosses placenta and is present in breastmilk
      (4) Mean elimination half-life is 14 hours
   b. Metabolism—liver via interaction with CYP3A4 enzyme
   c. Excretion—eliminated primarily in bile; does not appear to undergo enterohepatic recirculation; less than 2% eliminated via urine

4. Pharmacodynamics
   a. Reduces cholesterol production in liver through inhibition of HMG CoA, an enzyme involved in cholesterol synthesis
   b. Stimulates up-regulation of LDL receptors in liver, which bind the LDL and increase extraction from plasma
   c. Some statins cause decrease in triglycerides and increase in HDL secondary to LDL reduction
   d. Improves plaque stability while reducing endothelial inflammation

5. Adverse reactions
   a. Muscle pain and soreness or muscle cramps—may be resolved with switch to different statin
   b. Rhabdomyolysis—rare, skeletal muscle breakdown that may cause renal dysfunction; check creatine kinase level if significant muscle pain or weakness or dark-colored urine
   c. GI effects—abdominal pain, constipation, diarrhea, nausea
   d. Asymptomatic elevations in hepatic aminotransferase activity

6. Drug interactions
   a. Concurrent use of drugs that increase serum levels of statins increases the risk for myopathy and rhabdomyolysis
   b. CYP3A4 enzyme inhibitors—for example, macrolide antibiotics, selective serotonin reuptake inhibitors, ketoconazole, protease inhibitors, rifampin, calcium channel blockers, cimetidine, and grapefruit juice (large quantities) increase statin serum levels
   c. Concurrent use with other antilipid drugs such as gemfibrozil and niacin increases risk for myopathy and rhabdomyolysis
   d. Warfarin—increased anticoagulant effect
   e. Digoxin—slight increase in digoxin levels

7. Contraindications/precautions
   a. Do not use in pregnancy
   b. Active liver disease with elevated liver enzymes

8. Use in pregnancy and lactation
   a. Contraindicated in pregnancy—can cause adverse fetal outcomes; CNS and limb abnormalities found in animal studies
   b. Contraindicated for women who are breastfeeding

9. Client education
   a. Follow a heart-healthy diet and regular exercise regime along with taking statin
   b. Report promptly any unexplained muscle pain, tenderness, or weakness, particularly if accompanied by malaise or fever
   c. Report promptly any symptoms that may indicate liver injury, including fatigue, anorexia, right upper abdominal discomfort, dark urine, or jaundice

- Tamoxifen

1. Class: selective estrogen receptor modulator (SERM)

2. Indications for use include:
   a. Treatment of estrogen receptor (ER) positive breast cancer
   b. Prevention of ER positive breast cancer for high-risk individuals

3. Pharmacokinetics
   a. Absorption and distribution
      (1) Peak plasma concentrations within 5 hours
      (2) Mean elimination half-life is 5–7 days
   b. Metabolism—tamoxifen is a prodrug metabolized to more active forms by various CYP450 enzymes in liver
   c. Excretion—primarily in feces

4. Pharmacodynamics
   a. Estrogen-antagonist effects—binds to ERs; prevents estrogen from binding, thus blocking its action at selected target sites, for example, breast tissue
   b. Partial estrogen agonist—acts like an estrogen in other sites, for example, uterus, bone

5. Adverse reactions
   a. Venous thromboembolism
   b. Endometrial cancer
   c. Hot flashes
   d. Nausea
   e. Menstrual irregularities
   f. Vaginal dryness
   g. Weight gain
   h. Bone loss in premenopausal women

6. Drug interactions
   a. May cause significant increase in effect of coumarin-type anticoagulants
   b. Increased risk for thromboembolic events when cytotoxic agents used in combination with tamoxifen
   c. Anastrozole decreases levels of oral tamoxifen oral by unspecified interaction mechanism
   d. Strong inhibitors of CYP2D6 may cause lower blood levels of active metabolite

7. Contraindications/precautions
   a. Hypersensitivity to drug
   b. History of thromboembolic event
   c. Pregnancy

8. Use in pregnancy and lactation
   a. No adequate and well-controlled studies of use in pregnant women
   b. Small number of reports of vaginal bleeding, spontaneous abortions, birth defects, fetal deaths in pregnant women
   c. Has been reported to inhibit lactation
   d. Unknown if drug is excreted in breastmilk

9. Client education
   a. Take with or without food
   b. Report any signs or symptoms that may indicate blood clot formation
   c. Report any unusual vaginal bleeding
Questions

Select the best answer.

1. Which of the following pharmacokinetic changes could decrease the effect of a medication?
   a. Decrease in plasma protein binding
   b. Increase in hepatic first-pass effect
   c. Increase in enterohepatic recirculation
   d. Increase in bioavailability

2. The 2015 FDA Pregnancy and Lactation Labeling Rule requires inclusion of:
   a. alternative medication choices when a particular drug is contraindicated during pregnancy.
   b. any available data on potential drug-associated effects on female and male fertility.
   c. expanded pregnancy letter category (A, B, C, D, X) information.
   d. information on a centralized pregnancy exposure registry for all drugs.

3. Plasma protein binding most significantly affects drug:
   a. absorption.
   b. distribution.
   c. metabolism.
   d. excretion.

4. The half-life of a drug is used to:
   a. calculate the loading dose needed to achieve immediately the desired steady state.
   b. determine the time required to reach steady state and dosage interval.
   c. estimate the therapeutic index.
   d. predict the likelihood of an adverse reaction.

5. Acyclovir is not effective in eliminating latent herpes virus because it:
   a. has a short elimination half-life of three to four hours.
   b. has only a 15–20% bioavailability.
   c. is a prodrug that is converted to active form by first-pass metabolism.
   d. is effective only against rapidly replicating herpes virus.

6. A patient taking metronidazole and cimetidine at the same time is at increased risk for:
   a. bothersome side effects from the metronidazole.
   b. decreased effectiveness of cimetidine.
   c. renal impairment.
   d. severe disulfiram type reaction.

7. The term used to describe a drug that initiates a physiologic response when it is bound to a drug receptor is:
   a. agonist.
   b. antagonist.
   c. metabolite.
   d. prodrug.

8. The term used to describe the propensity of a drug to bind with a specific receptor is:
   a. affinity.
   b. bioavailability.
   c. efficacy.
   d. potency.

9. Fluconazole is effective in a one-time dose because it:
   a. is rapidly absorbed in the GI tract.
   b. has a bioavailability over 90%.
   c. is widely distributed into body tissues and fluids.
   d. has a mean elimination half-life of 30 hours.

10. Which of the following statements in regard to pharmacokinetic changes during pregnancy is correct?
    a. First-pass metabolism of drugs is increased during pregnancy because of increased blood flow through the liver.
    b. Drug elimination may be faster because of an increase in glomerular filtration rate.
    c. Higher levels of drug protein binding may occur with decreased albumin levels.
    d. Drug absorption may be decreased because of increased plasma volume.

11. Instructions for a patient for whom you are prescribing an oral bisphosphonate should include:
    a. take in the evening at bedtime.
    b. take with an antacid to avoid gastrointestinal irritation.
    c. take with eight ounces of plain water.
    d. take with orange juice to enhance absorption.

12. A common side effect of oral oxybutynin is:
    a. dry mouth.
    b. nausea.
    c. increased sweating.
    d. muscle pain.

13. Which of the following medications is considered a prodrug metabolized to a more active form by enzymes in the liver?
    a. Alendronate
    b. Atorvastatin
    c. Oxybutynin
    d. Tamoxifen

14. Rhabdomylosis, a rare skeletal muscle breakdown that may cause renal dysfunction, may occur as an adverse reaction to:
    a. atorvastatin.
    b. fluconazole.
    c. metronidazole.
    d. tamoxifen.

15. Which of the following statements is correct?
    a. A narrow therapeutic range is desired for reducing possible toxic effects of a drug.
    b. Drug–drug interactions may increase or decrease bioavailability of a drug.
    c. Drugs that are highly lipophilic are not likely to pass through the blood-brain barrier.
    d. Unpredictable adverse reactions to a drug may occur because of age, body mass, or gender.

16. The partial estrogen agonist effect of tamoxifen may result in:
    a. increased occurrence of hot flashes.
    b. increased risk for endometrial cancer.
    c. prevention of estrogen ability to bind to receptors in breast tissue.
    d. vaginal dryness.

17. The low serum bioavailability of atorvastatin is attributed to:
    a. extensive hepatic first-pass metabolism.
    b. high level of protein binding.
    c. minimal enterohepatic recirculation.
    d. short elimination half-life of two to three hours.
Answers with Rationales

1. b. Increase in hepatic first-pass effect
   Orally administered drugs go from the gastrointestinal tract through the portal system to the liver before going to the general circulation. Some metabolism (chemical inactivation) of drug may occur as it taken up by hepatic microsomal enzymes.
2. b. any available data on potential drug-associated effects on female and male fertility.
   The 2015 FDA Pregnancy and Lactation Labeling Rule requires inclusion of a female and male of reproductive potential subsection if human or animal study data show potential drug-associated effects on fertility and/or implantation loss.
3. b. distribution.
   Drugs may attach to proteins (mainly albumin) in the blood (plasma protein binding). Only unbound drug is active and able to move out of the blood into body fluids and body tissues (distribution).
4. b. determine the time required to reach steady state and dosage interval.
   Half-life of a drug is the time it takes for plasma concentration of a drug to be reduced by 50%. It can be used to determine the time required to reach steady state and dosage interval.
5. d. is effective only against rapidly replicating herpes virus.
   Acyclovir is selectively activated in infected cells and works by inhibiting viral DNA synthesis. Because it is effective only against rapidly replicating herpes virus, it is not effective in eliminating latent herpes virus.
6. a. bothersome side effects from the metronidazole.
   Cimetidine can decrease hepatic metabolism of metronidazole and increase serum levels.
7. a. agonist.
   One mechanism of drug effect is through drug–receptor interaction. A receptor can be a cellular protein, enzyme, or membrane that when bound to a drug initiates a physiologic response or blocks a response that the receptor normally stimulates. The term agonist refers to a drug that, when combined with the receptor, stimulates a physiologic response. The term antagonist refers to a drug that, when combined with the receptor, blocks the response.
8. a. affinity.
   Affinity is the propensity of a drug to bind itself to a given receptor site. Efficacy is the ability of the drug to initiate biologic activity as a result of such binding.
9. d. has a mean elimination half-life of 30 hours.
   Half-life is the time it takes for plasma concentration to be reduced by 50% and is used to determine both time required to reach a steady state and dosage interval. Based on a half-life of 30 hours, the recommended dose of fluconazole for uncomplicated vulvovaginal candidiasis is 150 mg oral tablet in a single dose.
10. b. Drug elimination may be faster because of an increase in glomerular filtration rate.
    Glomerular filtration rate (GFR) begins increasing early in pregnancy, peaks at 9 to 16 weeks, and plateaus at a rate about 50% above that of prepregnancy at 34 to 36 weeks. Increased GFR can result in faster elimination of some drugs, resulting in a lower serum concentration during pregnancy.
11. c. take with eight ounces of plain water.
    Instructions for the patient for whom you are prescribing an oral bisphosphonate should include taking it with eight ounces of plain water.
12. a. dry mouth.
    The anticholinergic action of oxybutynin may cause side effects such as dry mouth, constipation, urinary retention, blurred vision, impaired sweating, and drowsiness.
13. d. Tamoxifen
    Tamoxifen is a prodrug metabolized to a more active form by enzymes in the liver.
14. a. atorvastatin.
    Rhabdomyolysis, a rare skeletal muscle breakdown that may cause renal dysfunction, may occur as an adverse reaction to atorvastatin. Check creatine kinase level if the patient reports significant muscle pain or weakness or dark-colored urine while on atorvastatin.
15. b. Drug–drug interactions may increase or decrease bioavailability of a drug.
    Drug–drug interactions may induce or inhibit enzyme activity to either increase or decrease hepatic metabolism and thus bioavailability of a drug. These interactions may increase the risk for drug toxicity or reduce the effect of a drug.
16. b. increased risk for endometrial cancer.
    The partial estrogen agonist effect of tamoxifen results in an increased risk for endometrial cancer.
17. a. extensive hepatic first-pass metabolism.
    The low serum bioavailability of atorvastatin is attributed to extensive hepatic first-pass metabolism. This extensive first-pass metabolism is beneficial because the liver is the target organ for the drug to decrease low density lipoprotein levels.

Bibliography


Reproductive Anatomy and Physiology

• Reproductive organs

1. Breast—a modified sebaceous/mammary gland responsible for lactation; located within the superficial fascia of the anterior chest wall over the pectoral muscles; extends from clavicle and second rib down to sixth rib and from sternum across the midaxillary line; supported by fibrous tissue (Cooper's ligaments); a triangle of breast tissue (tail of Spence) extends laterally across the anterior axillary fold
   a. Body—composed of lobes, lobules, and alveoli
      (1) Lobes—sections of breast composed of glandular tissue and surrounded by fatty and connective tissue radiating around the nipple; 15 to 20 each breast
      (2) Lobules—small glands within each lobe containing tiny, hollow sacs called alveoli responsible for milk production
      (3) Each lobe empties into a single lactiferous duct that opens out through the nipple; lactiferous ducts enlarge behind the nipple to form small reservoirs called lactiferous sinuses
      (4) Unique proliferation occurs under influence of estrogen during puberty
   b. Nipple—composed of pigmented erectile tissue, areola, and Montgomery's glands; terminus into which lactiferous sinuses secrete milk
      (1) Areola—circular pigmented area that surrounds the nipple
      (2) Montgomery's glands—sebaceous glands that circle the nipple located within the areola
   c. Lymphatics—most drain toward the axilla
      (1) Central nodes along chest wall, high in axilla between anterior and posterior axillary folds; most likely to be palpable; pectoral, subscapular, lateral nodes drain into central nodes
      (2) Central nodes drain into infraclavicular and suprACLavicular nodes; internal mammary chain also drains into infraclavicular nodes

2. External genitalia—composed of the vulva and its associated structures
   a. Vulva—visible external structures bordered by symphysis pubis anteriorly, buttocks posteriorly, and thighs laterally; develops as a secondary sex characteristic under the influence of estrogen during puberty
      (1) Mons pubis—fatty tissue prominence overlying symphysis pubis, covered by coarse hair in an inverted triangular pattern
      (2) Labia majora—two longitudinal folds of adipose tissue extending from the mons pubis downward and enclosing four structures:
         (a) Labia minora—thin folds inside/parallel to the labia majora; forms prepuce anteriorly, encloses the vestibule, and terminates in the fourchette above the perineum
         (b) Clitoris—small erectile body of tissue; abundant supply of sensory nerve endings; rich vascular supply; important for female sexual response
         (c) Vestibule—contains urethral/vaginal openings, hymen, Skene's glands on each side of the urethral meatus, Bartholin's glands with openings located posteriorly on each side of vaginal orifice
         (d) Perineum—located between the fourchette anteriorly and the anus posteriorly
   b. Pelvic musculature—consists of perineal muscles and pelvic floor muscles
      (1) Perineal muscles
         (a) Bulbocavernosus—surrounds vagina and acts as weak sphincter
         (b) Ischiovernosus—surrounds clitoris; responsible for clitoral erection
         (c) Superficial/deep transverse perineal muscles—converge with urethral sphincter
         (d) External anal sphincter
(2) Pelvic floor muscles
(a) Levator ani—pubococcygeus, iliococcygeus, and ischiococcygeus muscles
(b) Pubococcygeus—pubovaginalis, puborectalis, and pubococcygeus proper

3. Internal pelvic structures—develop primarily as a result of stimulation by estrogen initiated during puberty; structures reach their adult size/appearance by approximately age 16
a. Vagina—muscular/membranous canal that connects the external genitalia to the uterus
   (1) Length—approximately 7 cm anterior, 10 cm posterior
   (2) Stratified squamous epithelium
   (3) Rugae—transverse folds in sidewalls; allows for distention during coitus and childbirth
   (4) pH—acidic because of prevalence of lactobacilli, which in turn is due to influence of estrogen initiated during puberty
b. Uterus—pear-shaped organ that is composed of the following:
   (1) Cervix—round, firm terminus to the uterus that protrudes into the vagina; approximately 2.5 cm in length
      (a) Os—opening in cervix that provides access to the uterine cavity; external os is proximal to the vagina, and internal os is proximal to the uterine cavity
      (b) Squamocolumnar junction—juncture of the squamous epithelium covering the cervical body (portio) and the columnar epithelium lining the endocervix
      (c) Transformation zone—area around the squamocolumnar junction where squamous metaplasia occurs
      (d) Squamous metaplasia—process whereby columnar cells of the endocervix are replaced by mature squamous epithelium
   (2) Uterine body—extends upward from cervix and lies in the pelvic cavity; contains cavity or potential space that can accommodate pregnancy
      (a) Located between bladder and rectum
      (b) Approximately 8 cm in length, 5 cm in width, 2.5 cm in thickness
      (c) Composed externally of thick myometrial muscles (myometrium)
      (d) Composed internally of columnar epithelium (endometrium); shed during menstruation
      (e) Fundus—top portion where fallopian tubes insert
      (f) Isthmus (lower uterine segment)—immediately superior to cervix
      (g) Corpus—main body
c. Fallopian tubes—ciliated oviducts that transport ova from the ovaries to the uterus
   (1) Length—approximately 10 cm
   (2) Interstitial portion—within uterus
   (3) Isthmus—main body
   (4) Ampulla—adjacent to the ovary; receives ova at ovulation
   (5) Fimbriated ends/infundibulum
d. Ovaries—pair of endocrine organs located at the end of fallopian tubes
   (1) Responsible for secretion of steroid hormones—estrogen/progesterone
   (2) Approximately 3 cm × 2 cm × 1 cm
   (3) Cyclic release of ovum
   e. Lymphatics—lymph from vulva and lower vagina drains into inguinal nodes; lymph from internal genitalia and upper vagina drains into pelvic and abdominal nodes
   • Puberty/adolescence—adolescence defined means “to grow up”;
     puberty denotes the biology of adolescence, beginning around age 9 years and culminating in development of regular menstrual cycles; some variations with ethnicity, race, and nutritional status
     1. Hormonal changes—begin as hypothalamic-pituitary-ovarian axis matures
        a. Gonadotropin-releasing hormone (GnRH)—released from hypothalamus
        b. Gonadotropins—follicle-stimulating hormone (FSH) and luteinizing hormone (LH) released from anterior pituitary gland in response to GnRH
        c. Estrogen—primarily released by ovary in response to FSH; results in development of secondary sex characteristics and ultimately in menstruation
     2. Physical changes—physical characteristics of breast and pubic hair development and distribution delineate progressive advancement of physiologic maturity
        a. Growth spurt—girls may grow from 6 to 11 cm taller; greatest height velocity (peak of growth spurt) occurs around age 12 or just prior to onset of menses
        b. Thelarche—breast development; begins with breast budding around age 9, progresses to conical shape followed by fully developed breast with round contour around age 17
        c. Adrenarche—growth of pubic and axillary hair; results from secretion of adrenal androgens; usually starts after breast development begins
        d. Menstruation—results from shedding of estrogen-primed endometrium; average age is 12.5 years following peak height velocity
        e. Tanner stages—used to assess progressive sexual maturity changes that occur in breast development and pubic hair growth
   • Reproductive years
     1. Effect of hormones
        a. Estrogen—steroid hormone responsible for development of secondary sex characteristics; produced by ovarian follicles, adrenal cortex, corpus luteum; predominant in follicular phase of menstrual cycle
           (1) Estradiol—most potent; derived from ovarian follicles, particularly dominant follicle; primary estrogen of reproductive age
           (2) Estrone—estrogen of menopause; converted from androstenedione produced by adrenal gland and ovarian stroma
           (3) Estriol—least potent; estrogen of pregnancy; derived from conversion of estrone and estradiol in liver, uterus, placenta, and fetal adrenal gland
           (4) Breasts develop fully to round adult contour—development/growth of ductal system, lobular, alveolar growth
           (5) External genitalia—some further increase in size of labia majora, clitoris, completed in middle to late twenties
           (6) Internal pelvic structures
              a. Vagina lengthens to approximately 10 cm; pH less than 4.5; rugae appear
(b) Uterus—proliferative endometrium; thin, clear cervical mucus
(c) Ovaries—follicular development; approximately 3 cm long, 2 cm wide, and 1 cm thick

b. Progesterone—steroid hormone produced by ovarian corpus luteum and conversion of adrenal pregnenolone/pregnenolone sulfate; predominant in luteal phase of menstrual cycle
   (1) Uterus—secretory endometrium; thickens cervical mucus
   (2) Ovary—supplied by corpus luteum; level of 3 ng/mL or greater indicates ovulation
   (3) Breast—subcutaneous fluid retention

   c. Prostaglandins—group of lipid compounds derived from fatty acids at a number of different sites in body via enzymatic action (prostaglandin synthetase enzymes) acting at target sites near area of secretion; regulate contraction and relaxation of smooth muscle
   (1) Produced by endometrium; peak levels in late secretory phase
   (2) Stimulates uterine myometrial contractions

d. Gonadotropin-releasing hormone—released from hypothalamus
   (1) Stimulates anterior pituitary gland to release FSH/LH
   (2) Pulsatile release

   e. Follicle-stimulating hormone—gonadotropin; released by anterior pituitary gland in response to GnRH from hypothalamus
   (1) Ovary—stimulates follicular growth
   (2) Positive/negative feedback from ovarian hormones determines level

   f. Luteinizing hormone—gonadotropin, released by anterior pituitary gland in response to GnRH from hypothalamus
   (1) “Surge” responsible for physical act of ovulation
   (2) Induces steroidogenesis and increases synthesis of androgens by the internal cells of ovary
   (3) Promotes follicular atresia in nondominant follicles
   (4) Promotes final growth of Graafian follicle
   (5) Promotes luteinization of granulosa cells

   g. Polypeptide hormones—produced by ovaries
      (1) Contribute to regulation of FSH and menstrual cycle
      (2) Inhibit acts directly on pituitary cells to selectively suppress FSH but not LH
      (3) Activin opposes the action of inhibin and stimulates FSH production; also synthesized in the pituitary gland
      (4) Follistatin binds to activin, thus inhibiting FSH secretion

h. Prolactin—anterior pituitary gland hormone
   (1) Progressive release during pregnancy
   (2) Stimulates synthesis of milk proteins in mammary tissue
   (3) Stimulates epithelial growth in breast during pregnancy

i. Androgens
   (1) Androgens are common precursors of estrogens
   (2) Dehydroepiandrosterone (DHA) is produced in the adrenal gland, ovarian stroma, and peripheral tissues
   (3) DHA is converted to testosterone in peripheral tissues
   (4) Androstenedione is produced in the adrenal gland and ovarian stroma

   (5) Androstenedione is converted to testosterone and estrone in peripheral tissues
   (6) Testosterone is produced in the adrenal gland, in the ovarian stroma, and through conversion of androstenedione and DHA in peripheral tissues
   (7) Testosterone is aromatized to estradiol in peripheral tissues

2. Menstrual cycle (see Figure 4-1)—timed from day 1 of one menstrual bleed to day 1 of next menstrual bleed; average 28 days plus or minus 2 days; duration 4 to 6 days plus or minus 2 days; volume average 40 cc

a. Ovarian cycle—defined by ovarian changes
   (1) Follicular phase
      (a) Begins day 1 menses
      (b) Variable length (time frame)
      (c) Increased FSH/LH
      (d) Increased estradiol (E2) from dominant follicle
      (e) Decreased FSH
      (f) LH surge (peak 10 to 12 hours before ovulation)
      (g) Thin cervical mucus

   (2) Ovulation
      (a) Prostaglandins and proteolytic enzymes break down the follicular wall
      (b) Follicle ruptures, releasing oocyte
      (c) Occurs 32–44 hours after LH surge begins
      (d) Maximal production of thin, stretchy, cervical mucus (spinnbarkeit)—refers to ability of cervical mucus to be “stretched” between two fingers; increased stretch equals increased influence of estrogen
      (e) Peak sexual desire
      (f) Increase in basal body temperature (BBT) of 0.2°F to 0.5°F

   (3) Luteal phase
      (a) Begins after ovulation occurs
      (b) Approximately 14 days plus or minus 2 days in length
      (c) Corpus luteum (CL) formed from ruptured follicle; secretes progesterone—peak 7 to 8 days postovulation
      (d) Thickened cervical mucus
      (e) Maintained increase in BBT
      (f) If no pregnancy, CL regresses and progesterone decreases
      (g) Ends with onset menses

b. Uterine cycle—defined by endometrial changes
   (1) Proliferative phase—estrogen influence
      (a) Endometrium grows/thickens
      (b) Lasts approximately 10 days from end of menses to ovulation

   (2) Secretory phase—progesterone influence
      (a) Average 12 to 16 days
      (b) From ovulation to menses
      (c) Endometrial hypertrophy
      (d) Increased vascularity
      (e) Favorable for implantation of fertilized ovum

   (3) Menstruation—declining progesterone from CL
      (a) Endometrium undergoes involution, necrosis, sloughing
      (b) Average three to six days
Well-Woman Visit: The Reproductive Years

- Includes health history, physical examination, screening tests, counseling, and immunizations based on age, risk factors, and individual's concerns
- General health history, physical examination, screening tests, immunizations, and health promotion counseling are covered in other sections of this text
- The focus for this section is reproductive/sexual/gynecologic health
- Adolescent (13–20 years of age)

1. Health history
   a. Menstrual, gynecologic, and obstetric history
   b. Psychosocial assessment—family and peer relationships; emotional, physical, or sexual abuse by family or partner; drug/alcohol use
   c. Sexuality/sexual history—sexual orientation, gender identity, sexual practices, sexual satisfaction, dyspareunia, use of contraception, use of condoms, exchange of sex for drugs or money

2. Physical examination
   a. Pelvic and breast examination not routinely recommended
   b. Perform if indicated by health history/risk factors
   c. May consider external-only genital examination

3. Screening tests
   a. Chlamydia and gonorrhea tests if sexually active (urine or self-collected vaginal specimen)
   b. Human immunodeficiency virus (HIV) screening test if sexually active
   c. Other as indicated by history/risk factors

4. Counseling/education
   a. Expected body changes during puberty
   b. Reproductive life planning—plan for having children, timing, use of contraception, preconception care
   c. Safer sex practices—abstinence, condom use, limiting partners, sexually transmitted infection (STI) screening; acquaintance rape prevention; Internet/phone safety
   d. Other as indicated by health history/physical examination/risk factors

5. Immunizations—human papillomavirus (HPV) vaccination series for cervical cancer prevention

- Ages 21–29 years

1. Health history
   a. Menstrual, gynecologic, and obstetric history
   b. Psychosocial assessment—emotional, physical, or sexual abuse by family or partner, current or past; drug/alcohol use
   c. Sexuality/sexual history—sexual orientation, gender identity, sexual practices, sexual satisfaction, dyspareunia, use of contraception, use of condoms, exchange of sex for drugs or money

2. Physical examination
   a. Clinical breast examination (CBE)—American College of Obstetricians and Gynecologists (ACOG): every year, American Cancer Society (ACS), United States Preventive Services Taskforce (USPSTF): not recommended for women at average risk for breast cancer
   b. Pelvic examination—periodic, if need Pap test or otherwise indicated
   c. Other as indicated by health history/risk factors

3. Screening tests
   a. Chlamydia and gonorrhea tests if sexually active (age 25 or younger) or if older and has risk factors
   b. HIV screening if sexually active

- Figure 4-1 Phases of menstrual cycle
c. Pap test (ACS, ACOG)—cytology alone every three years
d. Other as indicated by health history/risk factors

4. Counseling/education
   a. Reproductive life planning—plan for having children, timing, use of contraception, preconception care
   b. Safer sex practices—abstinence, condom use, limiting partners, STI screening
c. Breast health—breast self-awareness
d. Purpose of Pap tests and how often to schedule
e. Other as indicated by health history/physical examination/risk factors

5. Immunizations—HPV vaccination series for cervical cancer prevention if not done earlier and 26 years of age or younger

• Ages 30–49

1. Health history
   a. Menstrual, gynecologic, and obstetric history; menopausal symptoms; pelvic prolapse; urinary or fecal incontinence
   b. Psychosocial assessment—emotional, physical, or sexual abuse by family or partner, current or past; drug/alcohol use
c. Sexuality/sexual history—sexual orientation, gender identity, sexual practices, sexual satisfaction, dyspareunia, use of contraception, use of condoms, exchange of sex for drugs or money

2. Physical examination
   a. Clinical breast examination—ACOG: yearly, ACS, USPSTF: not recommended for women at average risk for breast cancer
   b. Pelvic examination—if need Pap test or otherwise indicated
c. Other as indicated by health history/risk factors

3. Screening tests
   a. Pap test (ACS, ACOG) —cytology with HPV test every five years or cytology alone every three years
   b. Mammogram
      (1) ACOG—yearly beginning at age 40 years
      (2) ACS—yearly beginning at age 45 years for women at average risk, women age 55 and older can transition to biennial screening or continue annual screening if they prefer
      (3) USPSTF—biennial screening from age 50 to 74 years (Grade B recommendation)
      (4) ACOG and ACS—no definitive age to discontinue, based on woman's health and whether or not she would be candidate for treatment of breast cancer
      (5) USPSTF—evidence insufficient to assess the balance of benefits and harms of screening mammography in women aged 75 years or older (Grade I)
c. HIV screening if sexually active
d. Other as indicated by health history/risk factors

4. Counseling/education
   a. Safer sex practices—abstinence, condom use, limiting partners, STI screening
   b. Breast health—breast self-awareness, purpose of screening mammograms
c. Purpose of Pap tests, how often to schedule
d. Expected physical and hormonal changes during perimenopause
e. Management of menopausal symptoms—see Chapter 5, “Well-Woman Care: Menopause and Beyond”
f. Other as indicated by health history/physical examination/risk factors

Breast Health

• Clinical breast examination
  1. ACS does not recommend CBE for breast cancer screening among average-risk women at any age; average risk is no personal history of breast cancer, no suspected or confirmed genetic mutation known to increase risk of breast cancer, no previous radiotherapy to the chest at a young age
  2. ACOG—recommends CBE every year for women aged 20 and older
  3. USPSTF—evidence insufficient to assess the balance of benefits and harms of CBE if woman is being screened with mammograms (Grade I)

• Breast self-awareness (BSA)
  1. ACOG and ACS—educate women age 20 and older about BSA and when to seek further evaluation
  2. Encourage women to know normal appearance and feel of one's breasts so they can be alert to any changes; no systematic or regular technique of self-examination

• Screening mammography
  1. ACOG—yearly beginning at age 40 years
  2. ACS—yearly beginning at age 45 years for women at average risk, women age 55 and older can transition to biennial screening or continue annual screening if they prefer
  3. USPSTF—biennial screening from age 50 to 74 years (Grade B recommendation)
  4. ACOG and ACS—no definitive age to discontinue, based on woman’s health and whether or not she would be candidate for treatment of breast cancer
  5. USPSTF—evidence insufficient to assess the balance of benefits and harms of screening mammography in women aged 75 years or older (Grade I)
  6. Ten percent to 15% false-negative rate for detection of malignancies

• BRCA1/BRCA2 breast cancer gene testing
  1. 5% to 10% of breast cancer is hereditary—result from gene mutation inherited from a parent
  2. BRCA1 and BRCA2 mutations are the most common
  3. Lifetime risk of breast cancer with BRCA1 mutation on average is 55% to 65% but may be as high as 80%; risk with BRCA2 mutation is around 45%; lifetime risk without mutation is 13%
  4. Women identified with risk for hereditary breast cancer should be referred for genetic counseling and possible genetic testing. Risks include:
     a. Personal history of breast cancer age ≤ 50 years; triple negative breast cancer age ≤ 60 years; breast cancer at any age if Ashkenazi Jewish inheritance; ovarian, fallopian tube, or primary peritoneal cancer
b. Family history of known mutation carrier; breast cancer age ≤ 50 years; male breast cancer; ovarian, fallopian tube, or primary peritoneal cancer; two or more relatives on same side of family with breast or pancreatic cancer


Sexuality

- Sexuality encompasses a wide range of values, beliefs, attitudes, thoughts, and behaviors experienced and/or expressed throughout life
- Biological, psychological, physical, social, religious, and cultural factors interact to influence one’s sexuality and sexual health
- Gender and sex terminology
  1. Sex—designation based on chromosomes and genitalia
  2. Natal sex—sex designation assigned at birth based on appearance of genitalia
  3. Gender—social construct assigning roles and attributes to individual based on natal sex
  4. Gender identity—internal understanding of oneself in regard to gender
  5. Cisgender—individual whose gender identity is the same as their natal sex
  6. Transgender—individual whose gender identity is in some way different than their natal sex
  7. Gender nonconforming—individual who identifies as both male and female, somewhere between male and female, or as having no gender
- Sexual orientation—general term used to describe individuals’ sexual attraction, identity and behavior
  1. Common labels include heterosexual, homosexual (gay or lesbian), bisexual, pansexual, asexual
  2. Queer—umbrella term to describe all individuals with non-cisgender and nonheterosexual identities; historically derogatory term now reclaimed by some members in the non-cisgender and nonheterosexual community
- Sexual drive—biological component of desire, based on neuroendocrine mechanisms
- Sexual motivation—intrapsychic and interpersonal component, influenced by quality of relationship, emotional/psychological health, past sexual history, cultural and religious values
- Female sexual response
  1. Linear model (Masters & Johnson, 1966)—applied to both men and women; excitement (sensory stimulation leads to vasocongestion), plateau (increased vasocongestion and pelvic floor muscle tension), orgasm (widespread genitopelvic muscle contraction), resolution (return to nonstimulated state)
  2. Nonlinear model (Basson, 2000)—focuses on women; emotional intimacy and physical satisfaction, not necessarily orgasm, may be goal; recognizes female sexual motivation is complex and not an innate physiologic phenomenon
- PLISSIT model—used by clinicians who are not sex therapists to address sexual concerns and make appropriate referrals; PLISSIT: Permission giving, Limited Information giving, Specific Suggestions, Intensive Therapy

Diagnostic Studies and Laboratory Tests

Pap test
1. Purpose—a screening technique
   a. Increases detection and treatment of precancerous and early cancerous lesions of the uterine cervix
   b. Early detection decreases morbidity and mortality from invasive cervical cancer
2. Procedure
   a. Instruct patient to avoid douching, intercourse, and use of vaginal creams for 48 hours prior to Pap test screening
   b. Avoid scheduling when on menses
   c. Speculum may be lubricated with water or small amount of water-soluble lubricant prior to insertion
   d. Entire squamocolumnar junction (transformation zone) must be sampled with spatula/broom to avoid false negative related to sampling technique
   e. Endocervical sampling must be obtained with broom/cytobrush
   f. Rapid fixation with cytologic fixative is essential to avoid air-drying artifact unless specimen is transferred to aqueous solution

Wet mounts (preparations)
1. Purpose—to detect organisms responsible for symptoms of vulvovaginal infections through microscopic evaluation of vaginal discharge
2. Procedure
   a. Obtain specimen from posterior fornix and lateral vaginal walls
   b. Prepare initial slide with saline to detect clue cells, epithelial cells, red blood cells (RBCs), white blood cells (WBCs), trichomonads, yeast hyphae, and spores
   c. Second specimen can be prepared with potassium hydroxide (KOH) to facilitate visualization of yeast buds and pseudohyphae
   d. Addition of KOH may also be used to detect presence of amines (whiff test)

Human papillomavirus (HPV) tests
1. Purpose
   a. Triage of atypical squamous cells of undetermined significance (ASC-US) Pap test results to determine follow-up; co-screening with Pap test for women 30–65 years of age
   b. Not recommended for co-screening in women younger than 30
2. Procedure
   a. DNA-based tests are most commonly used
   b. Some RNA-based tests are now available
   c. Specimen collected with Pap test

Colposcopy
1. Purpose—to allow inspection of vagina, cervix, and/or vulva using a binocular microscope; detects lesions/abnormalities that may be biopsied for histologic examination; also used in anogenital examination to identify injuries from sexual assault
2. Procedure—vagina and/or cervix
   a. Position speculum and colposcope for complete visualization of cervix and vagina
   b. Swab cervix/vagina to remove secretions; wash cervix/vagina with 2% acetic acid to allow for easier identification of abnormalities
   c. Look for areas of abnormality
      (1) Aceto white areas
      (2) Abnormal vascular patterns—punctuation, mosaic pattern, “corkscrew vessels”
      (3) Leukoplakia—visible before application of acetic acid
   d. Biopsy any abnormal areas
   e. Apply pressure to biopsy site(s) with large swab to stop bleeding
   f. Apply silver nitrate or Monsel’s solution if bleeding continues

• Endometrial sampling
  1. Purpose—evaluate abnormal bleeding (perimenopause, postmenopause); rule out/confirm endometritis
  2. Procedure
     a. If pregnancy is a possibility, time to avoid potential disruption of implantation
     b. Inform woman she may experience cramping during time biopsy instrument is in uterus
     c. Perform bimanual examination—determine uterine position and size
     d. Cleanse ectocervix and vagina
     e. Apply tenaculum to stabilize cervix/provide traction
     f. Consider paracervical block if encounter cervical stenosis or spasm
     g. Gently pass flexible, endometrial suction cannula through cervix up to fundus
     h. Withdraw stilette/aspirate with syringe while rotating the cannula, moving from fundus down and repeating several times
     i. Transfer contents of cannula/syringe into histologic solution for transport to lab
     j. Remove tenaculum and control bleeding—pressure, silver nitrate, Monsel’s solution

• Vulvar biopsy
  1. Purpose—sample areas of vulva that appear abnormal for diagnostic purposes
  2. Procedure
     a. Identify vulvar lesion(s) to biopsy and inject local anesthetic
     b. Rotate punch biopsy instrument with downward pressure to obtain specimen
     c. Elevate incised specimen and remove with scissors
     d. Place specimen in histologic solution for transport to lab
     e. Control bleeding—pressure, silver nitrate, Monsel’s solution

• Pregnancy test
  1. Purpose—to detect human chorionic gonadotropin (hCG) in blood/urine
  2. Urine hCG tests
     a. Highly sensitive urine tests provide accurate qualitative (positive/negative) results with hCG levels as low as 5 to 50 mIU/mL
     b. May detect pregnancy as early as 28 days from last menstrual period
     c. First morning urine is best as will be most concentrated
     d. Cross-reactions with other hormones not a problem with highly sensitive urine tests
  3. Serum hCG radioimmunoassay (RIA) or immunometric assay
     a. Provides level of hCG (quantitative); not any advantage for use as qualitative (positive/negative) test over highly sensitive urine tests in most situations
     b. Single level useful if concern about ectopic pregnancy—should be able to visualize intrauterine pregnancy when level is 1,500–2,000 mIU/mL
     c. Serial testing of serum hCG allows following rise or fall of levels—assists in diagnosis of ectopic pregnancy, evolving spontaneous abortion, possible retained products of conception, surveillance for persistent trophoblastic proliferation after uterine evacuation of hydatidiform mole

• Serum hormonal levels
  1. Purpose—to evaluate and monitor treatment of infertility; to assist in differential diagnosis of gonadal dysfunction; to assist in diagnosis of certain neoplasms
  2. Correlate results with age and clinical presentation
  3. Levels fluctuate throughout menstrual cycle in reproductive-age women

4. Estradiol (E₂)
   a. Increased—adrenal tumor, estrogen-producing tumor, hepatic cirrhosis, hyperthyroidism
   b. Decreased—postmenopause, ovarian failure, primary or secondary hypogonadism, Turner’s syndrome, anorexia nervosa

5. Progesterone
   a. Increased—pregnancy, ovulation, progesterone-secreting ovarian tumor or cyst, congenital adrenal hyperplasia, hydatidiform mole
   b. Decreased—primary or secondary hypogonadism, threatened abortion, fetal demise, preeclampsia, short luteal phase syndrome

6. Follicle stimulating hormone (FSH)
   a. Increased—postmenopause, gonadotropin-secreting pituitary tumor, ovarian failure, primary hypogonadism, Turner’s syndrome
   b. Decreased—pregnancy, pituitary or hypothalamic dysfunction, hyperprolactinemia, anorexia nervosa

7. Luteinizing hormone
   a. Increased—postmenopause, primary hypogonadism, gonadal failure
   b. Decreased—pituitary or hypothalamic dysfunction, anorexia nervosa

• Pelvic ultrasound
  1. Purpose—use of high-frequency sound waves to evaluate internal organs/structure for diagnostic purposes
     a. Distinguish between solid and cystic pelvic masses
     b. Confirm viability and location of gestation/products of conception
     c. Determine endometrial thickness
     d. Evaluate size/location of uterine myomas
     e. Evaluate adnexal masses/fullness
Digital mammography may offer better detection in women who are premenopausal, are perimenopausal, and/or have dense breast tissue.

Tomosynthesis/three-dimensional (3D) mammography—modification of digital mammography providing images as thin slices; FDA approved for screening.

Mammographic findings standardized terminology—Breast Imaging Reporting and Data System (BI-RADS): six assessment categories (0–5) provide overall assessment of likelihood that findings represent a malignancy.

2. Procedure
   a. Instruct patient to avoid use of any underarm deodorant spray or powder prior to procedure
   b. Typically two views taken of each breast for screening mammogram
   c. Target specific area with multiple views and magnifications if suspicious lesion found on clinical breast examination or screening mammogram—diagnostic mammogram
   d. Referral and/or biopsy recommended on any clinically suspicious lesion regardless of mammography results

• Breast ultrasound
  1. Purpose—use of high-frequency sound waves as adjunct to mammography to assist in diagnosis of breast disease; not a screening tool
  a. Helpful in differentiating cystic from solid masses
  b. May be used as a guide for needle aspiration, for needle core biopsy, and in localization procedures
  2. Procedure—handheld, real-time, high-frequency probe passed over tissue to be examined

• Breast biopsy
  1. Purpose—determine whether breast mass found on examination or through imaging contains benign or malignant cells
  2. Procedure—fine-needle aspiration: obtains fluid/cells from breast mass
  a. Local anesthesia not usually necessary; cleanse area
  b. Secure breast mass with one hand; introduce 20- or 22-gauge needle attached to 10- to 20-mL syringe
  c. Withdraw all fluid from cyst and prepare slide of specimen if fluid is not clear
  d. If no fluid obtained, mass is likely solid; pass needle through mass several times with suction to obtain cellular specimen, then prepare slide
  e. Apply firm pressure over site for 5–10 minutes to prevent hematoma
  3. Procedure—tissue biopsy: provides definitive diagnosis with histologic findings providing foundation for treatment plan
  a. Wire-guided excisional biopsy—wire placed percutaneously in vicinity of abnormality by radiologist; needle may be placed over wire for better localization; surgeon uses wire to guide removal of abnormal tissue
  b. Stereotactic core needle biopsy—woman placed prone on table with breast in dependent position; breast imaged to localize lesion; core biopsy needle advanced into lesion; cores of tissue obtained for evaluation

• Screening/diagnostic tests for sexually transmitted infections (STIs)
  1. Chlamydia trachomatis
  a. Nucleic acid amplification test (NAAT)—test recommended by Centers for Disease Control and Prevention (CDC)
b. NAAT provides option of testing with urine, vaginal (provider or patient obtained), or endocervical sample; some approved for liquid-based cytology specimens; few approved for rectal or oropharyngeal specimens

c. Other tests—direct fluorescent antibody (DFA), enzyme immunoassay (EIA), DNA probe, tissue culture

2. Neisseria gonorrhoeae (GC)
   a. NAAT provides same testing ability as with Chlamydia
   b. Culture with antimicrobial sensitivity testing should be used with suspected or documented treatment failure

3. Treponema pallidum (syphilis)
   a. Dark field microscopy examination and direct fluorescent antibody tests of lesion exudate or tissue are definitive methods of diagnosing early syphilis
   b. Serology—provides for presumptive diagnosis
      (1) Nontreponemal tests
         (a) Venereal Disease Research Laboratories (VDRL)
         (b) Rapid plasma reagin (RPR)
         (c) Become positive 1 to 2 weeks past chancre
         (d) Reported as nonreactive or reactive
         (e) Reactive test also reported quantitatively as titer
         (f) Nonspecific
         (g) False positives associated with mononucleosis, collagen vascular disease, and some other medical conditions; usually see low titer 1:8
         (h) Reactive nontreponemal tests must be confirmed with a treponemal test
         (i) Titers are also used for follow-up after treatment
         (j) Nontreponemal tests usually become nonreactive with time after treatment
      (2) Treponemal tests
         (a) Fluorescent treponemal antibody absorption test (FTA-ABS)
         (b) Treponema pallidum immobilization test (TPI)
         (c) Reported as positive or negative; not quantitative
         (d) Specific
         (e) Treponemal tests usually remain positive indefinitely after treatment

4. Genital herpes simplex (herpes simplex virus [HSV])
   a. Tissue culture and polymerase chain reaction (PCR) are the CDC-recommended tests for patients presenting with genital lesions
      (1) PCR assays are more sensitive than tissue culture
      (2) Sensitivity varies with stage of infection—highest if sample vesicular lesion
   b. Cytologic tests—Pap test is insensitive and nonspecific; should not be relied on for diagnosis
   c. Type-specific serologic tests—serum; detect presence of HSV-1 and HSV-2 antibodies; may take 4 to 12 weeks for seroconversion; useful if history suggestive of HSV but no current lesions, negative culture of lesions but suspect HSV infection, partner with known HSV infection, or patient with HIV infection

5. Condyloma acuminata (genital warts)
   a. Generally diagnosed by inspection
   b. Biopsy rarely indicated—consider if diagnosis uncertain, atypical lesion appearance, no response to therapy, worsening during therapy, compromised immunity
   c. HPV testing is not recommended because test results would not change management
   d. Acetic acid application is not recommended because skin color change is not specific for HPV infection

6. Chancroid—culture/DNA probe

7. Trichomoniasis
   a. Microscopic evaluation of vaginal secretions with saline wet mount
      (1) Motile, flagellated protozoa
      (2) Greater than 10 WBC/high-power field
   b. Vaginal pH greater than 4.5
   c. NAAT testing—higher sensitivity (> 95%) than wet mount (51–65%) for trichomoniasis

8. Hepatitis B (HBV)
   a. Serologic testing
   b. Hepatitis B surface antigen (HBsAg)—seen with acute active infection; chronic active infection/carrier state
   c. Hepatitis B surface antibody (HBsAb)—seen with convalescence; indicates immunity to HBV
   d. Hepatitis B core antibody (HBcAb)—indicates past infection; chronic hepatitis
   e. Hepatitis B e-antigen (HBeAg)—seen with acute infection; indicates infectivity
   f. Hepatitis B e-antibody (HBeAb)—seen with convalescence; indicates decreased infectivity

9. Human immunodeficiency virus (HIV)
   a. Enzyme immunoassay (EIA) conducted in laboratory or as rapid screening at testing site using blood or oral mucosal transudate sample
   b. Western blot or immunofluorescence assay (IFA) used to confirm reactive EIA test
   c. HIV antibody detectable in 95% of individuals within six months of infection
   d. HIV-1 p24 antigen test detects HIV-1 antigen as early as two to six weeks after infection and declines once HIV antibodies develop
   e. Combined HIV antibody and p24 antigen test is available

• Bone density testing/bone densitometry
  1. Purpose—diagnosis and monitoring treatment of osteopenia and osteoporosis
     a. T-score used to compare bone density in postmenopausal woman to young adult female reference population.
        (1) Normal—bone mineral density (BMD) within 1 standard deviation (SD) of young normal adult; T-score above −1
        (2) Osteopenia—BMD between 1 and 2.5 SD below that of young normal adult; T-score between −1 and −2.5
        (3) Osteoporosis—BMD 2.5 SD or more below that of young normal adult; T-score at or below −2.5
     b. Z-score used to compare bone density in premenopausal woman to age-, gender-, and ethnicity-matched reference population; may be used in evaluation for secondary causes of osteoporosis
  2. Procedure for dual-energy X-ray absorptiometry (DEXA) scan—most-used technique, low radiation exposure
     a. Patient lies supine while imager passes over body
     b. Process takes about 10 to 15 minutes
c. Computer calculates density of patient's bones
d. Image/regions scanned for osteoporosis diagnosis—hip, spine, radius; use of other sites such as heel or finger may predict fracture risk but cannot be used for diagnosis

Fertility Control

- Contraceptive efficacy
  1. Risk of pregnancy—unintended pregnancy in first year of use
  2. Perfect use—pregnancy rate when used consistently and correctly at all times
  3. Typical use—pregnancy rate during actual use; includes inconsistent and incorrect use
  4. User characteristics that influence efficacy—frequency of intercourse, age, regularity of menstrual cycles
  5. Long-acting reversible contraceptive methods (e.g., intrauterine contraception and progestin-only contraceptive implants) are highly effective without concerns of inconsistent or incorrect use; consider as first-line options for adolescent and adult females

- Typical use effectiveness comparisons
  a. Less than one pregnancy per 100 women in one year—progestin-only contraceptive implant, intrauterine contraception, male and female sterilization
  b. Between 6 and 12 pregnancies per 100 women in one year—depot medroxyprogesterone acetate (DMPA), combination hormonal contraceptives (pills, patch, vaginal ring), progestin-only contraceptive pills, diaphragm
  c. Eighteen or more pregnancies per 100 women in one year—male and female condom, sponge, withdrawal, spermicides, fertility awareness methods

- Drug interactions that may decrease contraceptive efficacy
  a. Drugs that increase production of liver enzyme cytochrome P-450 may cause more rapid clearance of other drugs metabolized by this enzyme
  b. Drugs that increase cytochrome P-450—rifampin, rifapentine, some anticonvulsants, some antiretrovirals, griseofulvin, St. John's wort
  c. Contraceptives that may have decreased efficacy—all combination hormonal contraceptive methods, progestin-only contraceptive pills, progestin-only contraceptive implants
  d. Depo medroxyprogesterone acetate (DMPA) efficacy is not affected

- Maintaining efficacy when switching methods
  a. Use quick-start method—if switching among different combination hormonal contraceptives (CHC), progestin-only methods, or intrauterine contraceptives (IUC), start the new method the same day as discontinuing the other method
     (1) Start new method the same day an IUC or progestin-only implant is removed
     (2) Continue current method until day that IUC or progestin-only implant is placed
     (3) Start new method at time progestin-only injection is due
     (4) Follow backup contraception instructions for the new method the same as if not using quick-start method
  b. If gap of time between stopping one method/starting another method and unprotected intercourse occurs
     (1) Offer emergency contraception
     (2) Start new method no later than next day; exception: ideally do not start a hormonal method any sooner than five days after taking ulipristal acetate (UPA) because of concern may decrease effectiveness of UPA; use a barrier method or abstinence
     (3) Use backup method for seven days
     (4) Advise woman to have urine pregnancy test if no withdrawal bleed within three weeks

- Safety of contraceptive methods
  1. Major health risks associated with contraceptive use are uncommon; risk of death extremely low
  2. Most major health risks occur in women with underlying medical conditions
  3. Thorough health assessment for potential increase in risk with selected method is key
  4. Educate women about risks and danger signs
  5. CDC Medical Eligibility Criteria for Contraceptive Use (Centers for Disease Control and Prevention, 2016 a)—individual characteristics or known preexisting medical/pathologic condition affecting eligibility for use of a contraceptive method classified under one of four categories
     a. Category 1—condition for which there is no restriction on use of the method
     b. Category 2—condition where advantages of using method generally outweigh theoretical or proven risks
     c. Category 3—condition where theoretical or proven risks usually outweigh advantages of using method
     d. Category 4—condition that represents an unacceptable health risk if method is used

- Intrauterine contraception (IUC)
  1. Description—device placed in uterus for purpose of long-acting contraception
     a. Copper-releasing IUC (Copper T 380A)
        (1) T-shaped plastic device with copper wrapped around both vertical stem and horizontal arms
        (2) Effective for at least 10 years
     b. Levonorgestrel Intrauterine Systems (LNG IUS)—four types available
        (1) T-shaped plastic frame with steroid reservoir in vertical stem that contains levonorgestrel
        (2) Kyleena® and Liletta® effective three years; Mirena® and Kyleena® effective five years
  2. Mechanism of action
     a. Copper T 380A
        (1) Copper may inhibit sperm capacitation
        (2) Alters tubal/uterine transport of ovum
        (3) Enzymatic influence on endometrium
     b. LNG IUS—progestin influence
        (1) Thickens cervical mucus
        (2) Produces atrophic endometrium
        (3) Slows ovum transport through tube
        (4) Inhibits sperm motility and function
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3. Effectiveness/first-year failure rate
   a. Perfect use
      (1) Copper T—0.6%
      (2) LNG IUS—0.2%
   b. Typical use
      (1) Copper T—0.8%
      (2) LNG IUS—0.2%

4. Advantages
   a. Ease of use
   b. Not coitally dependent
   c. Effective
   d. Reversible
   e. Cost-effective (if used longer than one year)
   f. LNG IUS can decrease blood loss and dysmenorrhea during menses
   g. Effective choice for women who cannot use estrogen-containing methods
   h. Can be used during lactation and immediately postpartum

5. Disadvantages and side effects
   a. Altered menstrual bleeding patterns
      (1) Increased amount and length of menstrual bleeding—Copper T
      (2) Increased dysmenorrhea in first few months of use—Copper T
      (3) Irregular bleeding and spotting first few months of use—LNG IUS
      (4) Absence or decrease of bleeding—LNG IUS
   b. Risk of pelvic inflammatory disease (PID)—increased risk first 20 days following insertion
   c. Risk of spontaneous expulsion
      (1) May go undetected by the woman
      (2) More likely at time of menses

6. Contraindications (CDC categories 3 and 4)
   a. Category 4 for IUC use (Box 4-1)—do not use method if following conditions exist
   b. Category 3 for IUC use (Box 4-2)—use of the method not generally recommended for the following conditions unless other, more appropriate methods are not available or acceptable

Box 4-1 Category 4 for IUC Use
- Known/suspected pregnancy
- Postpartum or postabortion sepsis
- Unexplained vaginal bleeding prior to insertion and before evaluation
- Gestational trophoblastic disease with persistently elevated hCG levels or malignant disease with evidence or suspicion of intrauterine disease—initiation but not continuation
- Cervical cancer prior to insertion and awaiting treatment
- Current breast cancer within past five years—LNG IUS only
- Any uterine anatomical abnormalities distorting uterine cavity incompatible with IUC insertion
- Current PID, purulent cervicitis, chlamydia, or gonorrhea—initiation but not continuation
- Endometrial cancer—initiation but not continuation
- Known pelvic tuberculosis—initiation but not continuation

Box 4-2 Category 3 for IUC Use
- Ischemic heart disease occurring after insertion—LNG IUS only
- History of breast cancer with no evidence of disease for five years—LNG IUS only
- High likelihood of exposure to chlamydia or gonorrhea—initiation but not continuation
- AIDS (unless clinically well on antiretroviral therapy)—initiation but not continuation
- Severe cirrhosis, benign hepatocellular adenoma, or malignant hepatoma—LNG IUS only
- SLE with positive or unknown antiphospholipid antibodies—LNG IUS only
- SLE with severe thrombocytopenia—initiation of Copper T IUC only
- Solid organ transplantation with complications—initiation but not continuation
- Pelvic tuberculosis—continuation

7. Management
   a. Health assessment prior to initiation of method
      (1) History to include
         (a) STI/PID, vaginitis symptoms
         (b) STI risk factors
         (c) HIV status/exposure
         (d) Pap test history of abnormal results
         (e) Heavy menses/anemia
         (f) Menstrual history
      (2) Physical examination to include
         (a) Speculum examination to assess for possible vaginal/cervical infection
         (b) Chlamydia and GC tests/wet prep (if history/physical examination indicates)
         (c) Pregnancy test if indicated
         (d) Bimanual examination—contour, size, consistency, mobility, position of uterus
      (3) Placement technique
         (a) Wash cervix and vagina with antiseptic
         (b) Apply tenaculum to anterior or posterior lip of cervix and apply gentle traction to straighten axis of uterus
         (c) Sound uterus prior to placing IUC—should sound to length of 6 to 9 cm for best placement
         (d) Place IUC per manufacturer’s instructions
         (e) Trim IUC threads to 3 to 4 cm
         (f) Have patient remain supine until feels well—then monitor as sits up because the patient may have vaso-vagal reaction from instrumentation of cervical os
   b. Follow-up
      (1) Advise to return at any time to discuss side effects, other problems, desire to change method, and when time to remove or replace the IUC
      (2) No routine follow-up is required
      (3) At other routine visits, assess satisfaction with method, any concerns, any changes in health status or medications that might affect IUC use
c. Special considerations
   
   (1) Timing of placement
      (a) Not necessary to wait for menses if can be reasonably certain that patient is not pregnant
      (b) May be placed within 48 hours after delivery (vaginal and cesarean)
      (c) May be placed four or more weeks postpartum
      (d) Placement after 48 hours and before four weeks postpartum is associated with increased risk of uterine perforation
      (e) May be placed immediately following first- or second-trimester abortion
      (f) Use backup method for seven days after LNG-IUS placement; backup method not needed after placement of CU-IUD
   
   (2) Irregular bleeding (spotting/light bleeding/heavy bleeding/ prolonged bleeding)
      (a) Common first three to six months of CU-IUD use; irregular spotting/bleeding for several months and then amenorrhea common with LNG-IUS
      (b) Short term (five to seven days) nonsteroidal anti-inflammatory drugs (NSAIDs) may reduce bleeding when occurs
      (c) Assess for other causes if persistent abnormal bleeding or bleeding associated with pain—cervicitis; pregnancy, including ectopic; pelvic infection
      (d) Remove IUC if patient desires and provide alternative contraception; may consider switch to LNG IUS if having excessive bleeding with CU-IUD and patient wants to continue IUC as method
   
   (3) Cramping and pain
      (a) If severe—rule out perforation
      (b) If mild—NSAID/other analgesic or remove IUC
      (c) May indicate infection, pregnancy
   
   (4) Expulsion—2% to 10% within first year
      (a) Symptoms—cramping, spotting, dyspareunia, lengthening of threads
      (b) Partial expulsion
         i. Remove IUC
         ii. Rule out pregnancy/infection
         iii. Replace IUC if patient desires
         iv. Doxycycline for five to seven days
      (c) Complete expulsion
         i. Pregnancy test
         ii. Replace IUC if patient desires
   
   (5) Pregnancy
      (a) Ultrasound evaluation to rule out ectopic pregnancy
      (b) Remove IUC promptly regardless of plans for pregnancy—reduces risk for spontaneous abortion and preterm delivery
      (c) Spontaneous abortion—treat with doxycycline/ampicillin for seven days
      (d) Patient wants to continue pregnancy
         i. Advise concerning risk for spontaneous septic abortion if IUC not removed
         ii. If threads not visible, use ultrasound to see if IUC still present
         iii. If unable to remove IUC, monitor closely for infection during pregnancy
   
   (6) Perforation, embedding
      (a) Perforation occurs 1 in 1,000 insertions
         i. May or may not be associated with severe pain at time of insertion
         ii. Ultrasound to determine location—may require laparoscopic removal
         iii. If protrusion through cervix, can be removed in office with local anesthetic
      (b) Embedding
         i. Can remove IUC from uterus with forceps if visualized
         ii. May need to be removed with dilatation and curettage (D&C)
   
   (7) PID
      (a) Most IUC-related PID occurs within the first 20 days after insertion
      (b) No evidence supporting the use of prophylactic antibiotics to reduce postinsertion infection
      (c) Treat PID with appropriate antibiotics
      (d) Not necessary to remove IUC unless has current high risk for STI
   
   (8) Actinomycoses-like organisms on Pap test
      (a) Pap test does not diagnose actinomycosis infection
      (b) Actinomyces are normal female genital tract organisms
      (c) Colonization of Actinomyces more likely in IUC user
      (d) Pelvic actinomycosis is very rare but serious infection
      (e) Asymptomatic—inform IUC user of Pap test result; no treatment necessary; advise to contact healthcare provider if has infection symptoms
      (f) Symptomatic—endometritis
         i. Treat with antibiotics—sensitive to penicillin and several other antibiotics
         ii. Remove IUC—Actinomyces preferentially grow on foreign bodies
   
8. Instructions for using the method
   
   a. Check IUD threads
      (1) After each menses
      (2) If increased cramping
      (3) If absent—use backup birth control and notify healthcare provider
      (4) If longer—may be in process of expulsion; use backup birth control and notify healthcare provider
   
   b. Signs of infection—notify healthcare provider if
      (1) Pelvic pain
      (2) Vaginal discharge
      (3) Unexplained vaginal bleeding
   
   c. Monitor menses—notify healthcare provider if any of the following:
      (1) Heavy, irregular bleeding
      (2) Missed menses—may have amenorrhea with LNG IUS
      (3) Increased cramping
   
   d. Warning signs (PAINS)
      (1) Period late/missed; abnormal spotting or bleeding
      (2) Abdominal pain
      (3) Infection—vaginal discharge
      (4) Not feeling well—fever, aches, chills
      (5) String missing, shorter or longer
• Breast examination, pelvic examination, Pap test, STI tests

Vaginal secretion changes—dryness, leukorrhea

SLE with positive or unknown antiphospholipid antibodies

Thickens cervical mucus

Estradiol valerate (E2)

Disadvantages and side effects

Implant may be visible or palpable

Progestin-only implant—etonogestrel (Nexplanon)

1. Description—long-term (three years) contraceptive; single rod-shaped implant placed subdermally inner side of upper arm; provides low-dose sustained release of the progestin etonogestrel; rod is radiopaque

2. Mechanism of action

a. Suppresses LH—ovulation inhibited in almost all users
b. Produces atrophic endometrium
c. Thickens cervical mucus

d. Contains no estrogen for women with contraindications to estrogen or who cannot tolerate estrogenic side effects
e. Can be used during lactation and immediately postpartum
f. Affords long-term contraception (three years)
g. Reduced dysmenorrhea and pain from endometriosis

3. Effectiveness/first-year failure rate

a. Perfect use—0.05%
b. Typical use—0.05%
c. Unknown if overweight/obesity may reduce efficacy

4. Advantages

a. Ease of use
b. Effective
c. Reversible—most users ovulate within six weeks after removal of implant
d. Contains no estrogen for women with contraindications to estrogen or who cannot tolerate estrogenic side effects
e. Can be used during lactation and immediately postpartum
f. Affords long-term contraception (three years)
g. Reduced dysmenorrhea and pain from endometriosis

5. Disadvantages and side effects

a. Requires clinician insertion and removal; removal requires minor surgical procedure
b. Specific information on drug interactions is not available; very low-dose progestin; potential for reduced efficacy with same drugs as listed for combination oral contraceptives (COCs)
c. Pain, bruising, infection (potential) at insertion site
d. Irregular, prolonged, more frequent uterine bleeding especially in first few months; may have amenorrhea
e. No protection against STIs/HIV
f. Implant may be visible or palpable
g. Possible side effects include:
   (1) Increased incidence of functional ovarian cysts
   (2) Headache
   (3) Emotional lability
   (4) Breast tenderness
   (5) Loss of libido
   (6) Vaginal secretion changes—dryness, leukorrhea
   (7) Acne

6. Contraindications (CDC categories 3 and 4)

a. Category 4 for etonogestrel implant use—do not use method if breast cancer within past five years
b. Category 3 for use etonogestrel implant—use of the method not generally recommended for the following conditions unless other, more appropriate methods are not available or acceptable (Box 4-3)

7. Management

a. Health assessment prior to initiation of method
   (1) Elicit information from thorough history concerning any contraindications, risks, and specific noncontraceptive benefits for use of progestin-only implant

Box 4-3 Category 3 for Use of Etonogestrel Implant

• Ischemic heart disease or stroke occurring while using method
• Unexplained vaginal bleeding before evaluation
• History of breast cancer with no evidence of disease for five years
• Severe cirrhosis, benign hepatocellular adenoma, malignant hepatoma
• SLE with positive or unknown antiphospholipid antibodies

(2) Breast examination, pelvic examination, Pap test, STI tests are not needed prior to insertion of progestin-only implant but may be indicated for other reasons

b. Follow-up

(1) Advise patient to return at any time to discuss side effects or other problems, or if the patient wants to change method
(2) No routine follow-up required
(3) At other routine visits, assess satisfaction with method, any concerns, any changes in health status or medications that might affect progestin-only implant use

8. Instructions for using the method

a. Discuss possible bleeding changes prior to insertion
b. Inform patient must be replaced every three years for effective contraception
c. Insert within days 1 to 5 of menses; no backup method needed
d. If irregular menses, rule out pregnancy with menstrual and coital history and pregnancy test
e. If inserted other than days 1 to 5 of menses, use backup method for seven days
f. Discuss use of condoms for STI prevention
g. Warning signs to report
   (1) Abdominal pain (severe)
   (2) Arm pain or signs of infection
   (3) Heavy vaginal bleeding
   (4) Missed menses after period of regularity
   (5) Onset of severe headaches

• Combination oral contraceptives (COCs)

1. Description—pill taken daily for contraception; combination of estrogen and progestin; also has noncontraceptive applications

a. Monophasic pills—deliver constant amount of estrogen/progestin throughout cycle
b. Multiphasic pills—vary amount of estrogen and/or progestin delivered throughout cycle
c. Patterns of use—monthly cycling (21/7, 24/3), extended cycle, continuous use

2. Mechanism of action

a. Estrogen—inhibits ovulation through suppression of FSH, potentiates action of progestin, stabilizes endometrium for less unscheduled bleeding and spotting
   (1) Ethinyl estradiol (E2)—most prevalent synthetic estrogen in COCs
   (2) Estradiol valerate (E2V)—newer synthetic estrogen available in one brand of COC
b. Progestin—provides most of contraceptive effect; inhibits ovulation through suppression of LH surge; inhibits sperm penetration by thickening cervical mucus; progestins available vary in bioavailability, dose needed for ovulation inhibition, and half-life

(1) One method of categorizing progestins is by historical generation of introduction in COCs available in the United States

(2) First three generations include progestins that are derivatives of testosterone designated as 19-nortestosterones with class names of estranes and gonanes

(3) First-generation progestins (norethindrone, northindrone acetate, ethynodiol diacetate)—lowest potency, short half-life; lower doses more likely to have unscheduled bleeding and spotting

(4) Second-generation progestins (norgestrel, levonorgestrel)—more potent and longer half-life designed to decrease unscheduled bleeding and spotting, associated with more androgen-related side effects

(5) Third-generation progestins (desogestrel, norgestimate, gestodene [not available in United States])—designed to maintain potency of second-generation but with less androgenic side effects

(6) Fourth-generation progestins—one (drospirenone) is analog of spironolactone, a potassium-sparing diuretic; progestogenic effect, antiandrogenic properties. Another (dienogest) is a 19-nortestosterone with slightly different structure to maintain strong progestin effect and exert an antiandrogenic effect

3. Effectiveness/first-year failure rate
   a. Perfect use—0.3%
   b. Typical use—9%

4. Advantages
   a. Ease of use
   b. Reversible
   c. Effective
   d. May reduce incidence of/afford protection against
      (1) Acne
      (2) Dysmenorrhea
      (3) Pelvic inflammatory disease
      (4) Endometriosis
      (5) Iron-deficiency anemia
      (6) Osteoporosis
      (7) Benign breast conditions
      (8) Functional ovarian cysts
      (9) Ovarian cancer, endometrial cancer, colorectal cancer
      (10) Menstrual migraine headaches—extended-cycle or continuous use regimens
      (11) Premenstrual syndrome/premenstrual dysphoric disorder
   e. May be used as emergency contraception

5. Disadvantages/side effects
   a. Does not prevent transmission of STIs/HIV
   b. Requires user compliance/daily dosing schedule
   c. Side effects/adverse effects may include:
      (1) Possible estrogenic effects
         (a) Nausea
         (b) Increased breast size/breast tenderness
         (c) Chloasma
   
   (d) Telangiectasia
   (e) Cervical eversion/ectopy
   (f) Increased blood pressure
   (g) Increased cholesterol concentration in gallbladder bile
   (h) Migraine headaches
   (i) Increased triglycerides
   (j) Hepatocellular adenoma
   (k) Arterial thrombosis
   (l) Venous thromboembolism

(2) Possible progestogenic side effects/adverse effects
   (a) Breast tenderness
   (b) Fatigue
   (c) Depressive symptoms
   (d) Increased insulin resistance
   (e) Constipation/bloating
   (f) Precipitation of gallbladder sludge or stones
   (g) Cyclic weight gain

(3) Possible androgenic side effects/adverse effects
   (a) Increased appetite/weight gain
   (b) Hirsutism
   (c) Acne, oily skin
   (d) Increased LDL-C

6. Contraindications (CDC categories 3 and 4)
   a. Category 4 for COC use—do not use method if following conditions exist (Box 4-4)
   b. Category 3 for COC use—use of the method not generally recommended for the following conditions unless other, more appropriate methods are not available or acceptable (Box 4-5)

7. Management
   a. Health assessment prior to initiation of method
      (1) Elicit information from thorough history concerning any contraindications, risks, specific noncontraceptive benefits for use of COCs

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**Box 4-4 Category 4 for COC Use**

- Smoker 35 years of age or older, 15 or more cigarettes/day
- Multiple risk factors for arterial cardiovascular disease
- Hypertension (160/100 mm Hg) or hypertension with vascular disease
- Acute deep vein thrombosis (DVT) or pulmonary embolism (PE)
- History of DVT or PE and one or more risk factors for recurrence
- Major surgery with prolonged immobilization
- Known thrombogenic mutations
- History of or current ischemic heart disease, stroke, complicated valvular heart disease
- Migraine headaches with aura at any age
- Breast cancer within past five years
- Diabetes with nephropathy, retinopathy, neuropathy, other vascular disease; or diabetes longer than 20 years’ duration
- Active viral hepatitis, severe cirrhosis, hepatocellular adenoma, malignant hepatoma
- Systemic lupus erythematosus (SLE) with positive or unknown antiphospholipid antibodies
- Peripartum cardiomyopathy—moderately or severely impaired cardiac function or less than six months postpartum
- Solid organ transplantation with complications
- Less than 21 days postpartum (breastfeeding and nonbreastfeeding)
(2) Blood pressure

(3) Breast examination, pelvic examination, Pap test, STI tests are not needed prior to starting COC but may be indicated for other reasons

b. Follow-up

(1) Advise patient to return at any time to discuss side effects or other problems, or if the patient wants to change method

(2) No routine follow-up required

(3) At other routine visits, measure blood pressure; assess satisfaction with method, any concerns, any changes in health status or medications that might affect COC use

c. Special considerations

(1) Drug interactions

(a) Most broad-spectrum antibiotics (e.g., ampicillin, metronidazole, doxycycline, fluconazole) do not lower hormone levels or reduce COC effectiveness

(b) A few broad-spectrum antibiotics (e.g., rifampin, rifapentine, griseofulvin) do induce cytochrome P-450 enzyme activity and may reduce COC effectiveness

(c) Some anticonvulsants (carbamazepine, levetiracetam, oxcarbazepine, primidone, phenobarbital, phenytoin, topiramate) induce cytochrome P-450 enzyme activity

(d) Other anticonvulsants (clonazepam, gabapentin, pregabalin, valproic acid) do not induce cytochrome P-450 enzyme and do not affect COC efficacy

(e) Anticonvulsants may be used for treatment of other conditions: neuropathic pain, bipolar disease, schizophrenia, migraine headaches

(f) Some antiretroviral drugs (protease inhibitors) induce cytochrome P-450 enzyme and may affect COC efficacy

(g) St. John’s wort is a cytochrome P-450 enzyme inducer that may increase hepatic metabolism of COC

(h) Orlistat—blocks fat absorption and may reduce intestinal absorption of COCs as well as induce diarrhea

(2) Drug interactions—COCs may potentiate effect of some drugs

(a) Benzodiazepines—diazepam and chlordiazepoxide

(b) Tricyclic antidepressants

(c) Theophylline

(d) The following potassium-sparing drugs may interact with drosperone-containing COCs and cause hyperkalemia: angiotensin-converting-enzyme (ACE) inhibitors, angiotensin-II antagonists, potassium-sparing diuretics, heparin, aldosterone antagonists, chronic daily use of nonsteroidal anti-inflammatory drugs (NSAIDs); if taking any of these medications check potassium level after first cycle of COC

(3) Management of unscheduled bleeding/spotting

(a) Common side effect first three months of use; usually decreases over time

(b) Reinforce to take pills daily at the same time

(c) May consider timing of unscheduled bleeding in cycle to decide on pill formulation change if persists

(d) Spotting/bleeding before complete active pills—increase progesterin content for more endometrial support

(e) Continued spotting/bleeding following scheduled bleeding—increase estrogen content of first pills in pack or decrease progesterin content of first pills for more estrogen to proliferate endometrium

(f) Unscheduled spotting/bleeding with extended cycle or continuous use—take at least 21 active pills, take three to four days off for withdrawal bleed to start, restart active pills, and take for at least 21 days before stops again

(g) If problem persists, consider another cause for bleeding (e.g., infection, polyps)

(4) Management of absence of withdrawal bleeding

(a) Occurs in about 5% of women after several years of COC use

(b) Rule out pregnancy or other potential causes of amenorrhea

(c) No intervention required if woman is okay with no menses

(d) Change to 30–35 mcg estrogen if on 20-mcg COC or triphasic formulation with lower levels of progesterin in early pills

8. Instructions for use

a. General instructions

(1) Quick-start method—reasonably certain not pregnant, take first pill on day of office visit; backup method for seven days if more than five days since last menstrual period (LMP)

(2) First day start—take first pill on first day of menses; no backup method needed

(3) Take pill at approximately same time each day

(4) If nausea occurs, take pill with meals or at bedtime

(5) Use backup method (condoms) if efficacy/absorbency compromised by severe vomiting and/or diarrhea

(6) Emergency contraception instructions

(7) Use condoms for prevention of STIs/HIV

b. Recommended actions after late or missed COCs—see Figure 4-2

(Centers for Disease Control and Prevention, 2016b)
### Figure 4-2 Recommended actions after late or missed combination oral contraceptives


<table>
<thead>
<tr>
<th>If one hormonal pill is late: (&lt;24 hours since a pill should have been taken)</th>
<th>If one hormonal pill has been missed: (24 to &lt;48 hours since a pill should have been taken)</th>
<th>If two or more consecutive hormonal pills have been missed: (≥48 hours since a pill should have been taken)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Take the late or missed pill as soon as possible.</td>
<td>• Continue taking the remaining pills at the usual time (even if it means taking two pills on the same day).</td>
<td>• Take the most recent missed pill as soon as possible. (Any other missed pills should be discarded.)</td>
</tr>
<tr>
<td>• Continue taking the remaining pills at the usual time (even if it means taking two pills on the same day).</td>
<td>• No additional contraceptive protection is needed.</td>
<td>• Continue taking the remaining pills at the usual time (even if it means taking two pills on the same day).</td>
</tr>
<tr>
<td>• Emergency contraception is not usually needed but can be considered (with the exception of UPA) if hormonal pills were missed earlier in the cycle or in the last week of the previous cycle.</td>
<td>• Use back-up contraception (e.g., condoms) or avoid sexual intercourse until hormonal pills have been taken for 7 consecutive days.</td>
<td>• Use back-up contraception (e.g., condoms) or avoid sexual intercourse until hormonal pills from a new pack have been taken for 7 consecutive days.</td>
</tr>
<tr>
<td>• If pills were missed in the last week of hormonal pills (e.g., days 15–21 for 28-day pill packs):</td>
<td>• If pills were missed during the first week and unprotected sexual intercourse occurred in the previous 5 days.</td>
<td>• Emergency contraception should be considered (with the exception of UPA) if hormonal pills were missed during the first week and unprotected sexual intercourse occurred in the previous 5 days.</td>
</tr>
<tr>
<td>• Omit the hormone-free interval by finishing the hormonal pills in the current pack and starting a new pack the next day.</td>
<td>• Emergency contraception may also be considered (with the exception of UPA) at other times as appropriate.</td>
<td>• Emergency contraception may also be considered (with the exception of UPA) at other times as appropriate.</td>
</tr>
</tbody>
</table>

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c. Warning signs (ACHES)
   (1) Abdominal pain (severe)
   (2) Chest pain (sharp, severe, shortness of breath)
   (3) Headache (severe, dizziness, unilateral)
   (4) Eye problems (scotoma, blurred vision, blind spots)
   (5) Severe leg pain (calf or thigh)

- Transdermal contraceptive system
  1. Description—patch applied to skin; delivers continuous daily systemic dose of progestin (norelgestromin) and estrogen (ethinyl estradiol); new patch applied each week for three weeks, followed by one week without patch to induce withdrawal bleeding
  2. Mechanism of action—same as COCs
  3. Effectiveness/first-year failure rate
     a. Perfect use—0.3%
     b. Typical use—9%
  4. Advantages
     a. Ease of use—no daily dosing regimen
     b. Reversible
     c. Effective
     d. Good menstrual cycle control
  5. Disadvantages and side effects
     a. Does not prevent transmission of STIs/HIV
     b. Skin irritation at application site
     c. Other side effects similar to those of COCs
  6. Contraindications (CDC categories 3 and 4)—same as with COCs except history of bariatric surgery not relevant
  7. Management
     a. Health assessment prior to initiation—same as with COCs
     b. Follow-up—same as with COCs
     c. Special considerations
        (1) May be less effective in women who weigh 90 kg (198 lbs) or more
        (2) Probably same drug interactions as with COCs
  8. Instructions for using the method
     a. Quick-start method—reasonably certain not pregnant, apply patch on day of office visit; if more than five days since LMP, use backup method for seven days
     b. First day start—apply patch on first day of menses; no backup method needed
     c. Apply patch to buttocks, abdomen, upper torso front or back (excluding breasts), upper outer arm—rotate application site
     d. Apply new patch on same day each week for total of three weeks
     e. Do not wear patch on week 4; withdrawal bleeding will occur
     f. Use condoms for STI/HIV prevention
     g. Recommended actions after delayed application or detachment with contraceptive patch—see Figure 4-3 (Centers for Disease Control and Prevention, 2016b)
     h. Contact healthcare provider if warning signs occur—same as COC warning signs
Delayed application or detachment for <48 hours since a patch should have been applied or reattached

- Apply a new patch as soon as possible. (If detachment occurred <24 hours since the patch was applied, try to reapply the patch or replace with a new path.)
- Keep the same patch change day.
- No additional contraceptive protection is needed.
- Emergency contraception is not usually needed but can be considered (with the exception of UPA) if delayed application or detachment occurred earlier in the cycle or in the last week or the previous cycle.

Delayed application or detachment for ≥48 hours since a patch should have been applied or reattached

- Apply a new patch as soon as possible.
- Keep the same patch change day.
- Use back-up contraception (e.g., condoms) or avoid sexual intercourse until a patch has been worn for 7 consecutive days.
- If the delayed application or detachment occurred in the third week:
  - Omit the hormone-free week by finishing the third week of patch use (keeping the same patch change day) and starting a new patch immediately;
  - If unable to start a new patch immediately, use back-up contraception (e.g., condoms) or avoid sexual intercourse until a new patch has been worn for 7 consecutive days.
- Emergency contraception should be considered (with the exception of UPA) if the delayed application or detachment occurred within the first week of patch use and unprotected sexual intercourse occurred in the previous 5 days.
- Emergency contraception may also be considered (with the exception of UPA) at other times as appropriate.

**Figure 4-3  Recommended actions after delayed application or detachment with contraceptive patch**


- Contraceptive vaginal ring (NuvaRing)

  1. Description—soft, malleable, clear plastic ring; delivers continuous, systemic dose of estrogen (ethinyl estradiol) and progestin (etongestrel); worn in vagina for three weeks followed by one week without ring to induce withdrawal bleeding
  2. Mechanism of action—same as COCs
  3. Effectiveness/first-year failure rate
     a. Perfect use—0.3%
     b. Typical use—9%
  4. Advantages
     a. Ease of use—no daily dosing regimen
     b. Reversible
     c. Effective
     d. Good menstrual cycle control
  5. Disadvantages and side effects
     a. Does not prevent transmission of STIs/HIV
     b. Side effects similar to those of COCs
     c. Vaginal discharge/vaginal irritation
  6. Contraindications (CDC categories 3 and 4)—same as with COCs except history of bariatric surgery not relevant
  7. Management
     a. Health assessment prior to initiation—same as with COCs
     b. Follow-up—same as with COCs
     c. Special considerations—probably same drug interactions as with COCs
  8. Instructions for using the method
     a. Quick-start method—reasonably certain not pregnant, insert ring on day of office visit; if more than five days since LMP, use backup method for seven days
     b. First day start—insert ring on first day of menses; no backup method needed
     c. Wash hands before inserting
     d. Fold ring and gently insert into vagina
     e. Exact position of ring in vagina is not important
     f. Leave ring in vagina for three weeks then remove
     g. Insert new ring in seven days
  h. Recommended actions after delayed insertion or reinsertion of contraceptive vaginal ring—see Figure 4-4 (Centers for Disease Control and Prevention, 2016b)
     i. If ring is left in vagina for more than three weeks but less than four weeks, it should be removed; insert new ring after a ring-free period of one week
     j. If ring is left in vagina more than four weeks, it may not protect from pregnancy; use backup method until new ring in vagina for seven days
     k. Use condoms for prevention of STIs/HIV
     l. Contact healthcare provider if warning signs occur—same as COC warning signs

- Progesterin-only pills (POPs)

  1. Description—pill taken daily for purposes of contraception; composed of synthetic progestins in lower doses than those used in COCs
  2. Mechanism of action
     a. Inhibits ovulation—inconsistent; variable in different women
     b. Produces atrophic endometrium
     c. Thickens cervical mucus
  3. Effectiveness/first-year failure rate
     a. Perfect use—0.3%
     b. Typical use—9%
Instructions for using POPs

a. General instruction

1. Quick-start method—reasonably certain not pregnant, take first pill on day of office visit; backup method for 48 hours if more than five days since LMP
2. First day start—take first pill on first day of menses; no backup method needed
3. Take pill at same time each day, every day; no placebo/off week
4. If more than three hours late taking pill, use backup method for 48 hours
5. Advise may have irregular periods or may have amenorrhea

b. Warning signs

1. Severe low abdominal pain
2. No bleeding after series of regular cycles
3. Severe headache

Box 4-6 Category 3 for POP Use

- History of breast cancer with no evidence of disease for five years
- Severe cirrhosis, benign hepatocellular adenoma, malignant hepatoma
- History of bariatric surgery with malabsorptive procedure
- Ischemic heart disease or stroke occurring while on POP
- SLE and positive or unknown antiphospholipid antibodies
- Taking ritonavir boosted protease inhibitors as part of HIV/AIDS treatment; some anticonvulsants; rifampin or rifabutin

8. Instructions for using POPs

a. General instruction

(1) Quick-start method—reasonably certain not pregnant, take first pill on day of office visit; backup method for 48 hours if more than five days since LMP
(2) First day start—take first pill on first day of menses; no backup method needed
(3) Take pill at same time each day, every day; no placebo/off week
(4) If more than three hours late taking pill, use backup method for 48 hours
(5) Advise may have irregular periods or may have amenorrhea

b. Warning signs

(1) Severe low abdominal pain
(2) No bleeding after series of regular cycles
(3) Severe headache

- Progestin-only injectable contraception (Depo medroxyprogesterone acetate [DMPA])

1. Description—intramuscular (IM) or subcutaneous (SC); injectable progestin administered in three-month intervals for contraception

Figure 4-4 Recommended actions after delayed insertion or reinsertion of contraceptive vaginal ring


Delayed insertion of a new ring or delayed reinsertion of a current ring for ≤48 hours since a ring should have been inserted

- Insert ring as soon as possible.
- Keep the ring in until the scheduled ring removal day.
- Use back-up contraception (e.g., condoms) or avoid sexual intercourse until a ring has been worn for 7 consecutive days.
- If the ring removal occurred in the third week of ring use:
  - Omit the hormone-free week by finishing the third week of ring use and starting a new ring immediately.
  - If unable to start a new ring immediately, use back-up contraception (e.g., condoms) or avoid sexual intercourse until a new ring has been worn for 7 consecutive days.
- Emergency contraception should be considered (with the exception of UPA) if the delayed insertion or reinsertion occurred within the first week of ring use and unprotected sexual intercourse occurred in the previous 5 days.
- Emergency contraception may also be considered (with the exception of UPA) at other times as appropriate.

Delayed insertion of a new ring or delayed reinsertion of a current ring ≥48 hours since a ring should have been inserted

- Insert ring as soon as possible.
- Keep the ring in until the scheduled ring removal day.
- No additional contraceptive protection is needed.
- Emergency contraception is not usually needed but can be considered (with the exception of UPA) if delayed insertion or reinsertion occurred earlier in the cycle or in the last week of the previous cycle.

Electronic reproductive health information and evidence-based practice recommendations for clinicians and women can be found at: http://www.fertilitycontrol.org
2. Mechanism of action
   a. Inhibits ovulation through suppression of FSH and LH
   b. Produces atrophic endometrium
   c. Thickens cervical mucus
3. Effectiveness/first-year failure rate
   a. Perfect use—0.2% 
   b. Typical use—6%
4. Advantages
   a. Ease of use
   b. Effective
   c. Long-term contraceptive option
   d. Does not require compliance with daily/event regimen
   e. Minimal drug interaction profile—only drug that may decrease effectiveness is aminoglutethimide used in Cushing’s disease treatment
   f. Results in absence of menstrual bleeding in up to 50% of women by end of first year of use (four injections); by end of second year, 70% are amenorrheic
   g. Contains no estrogen for women in whom it is contraindicated or who cannot tolerate estrogenic side effects
   h. Can be used during lactation and immediately postpartum
   i. May decrease the following
      (1) Intravascular sickling in patients with sickle cell disease
      (2) Incidence of seizures in affected individuals
      (3) Pain from endometriosis; SC formulation approved for treatment of pain associated with endometriosis.
      (4) Risk for pelvic inflammatory disease
      (5) Risk for endometrial cancer
5. Disadvantages/side effects
   a. Menstrual cycle irregularities
   b. Mastalgia
   c. Depression
   d. No protection against STIs/HIV
   e. Not immediately reversible—requires three months to be eliminated
   f. Requires routine three-month injection schedule
   g. Weight gain
      (1) Average 5.4 lbs first year
      (2) 13.8 lbs after 4 years
   h. Six- to 12-month delayed return to fertility in some women
   i. Decreased bone density in long-term (greater than five years) user—returned to normal following discontinuance
   j. May decrease HDL-C; may increase LDL-C and total cholesterol
6. Contraindications (CDC categories 3 and 4)
   a. Category 4 for DMPA use—do not use method if breast cancer within past five years
   b. Category 3 for DMPA use—use of the method not generally recommended for the following conditions unless other, more appropriate methods are not available or acceptable (Box 4-7)
7. Management
   a. Health assessment prior to initiation of method—same as with COCs
   b. Follow-up

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**Box 4-7 Category 3 for DMPA Use**

- Multiple risk factors for arterial cardiovascular disease
- Hypertension (160/100 mm Hg) or with vascular disease
- Current/history of ischemic heart disease or stroke
- History of breast cancer with no evidence of disease for five years
- Unexplained vaginal bleeding before evaluation
- Diabetes with nephropathy, retinopathy, neuropathy, other vascular disease; or diabetes longer than 20 years’ duration
- Severe cirrhosis, benign hepatocellular adenoma, malignant hepatoma
- SLE with positive or unknown antiphospholipid antibodies
- SLE with severe thrombocytopenia—initiation category 3, continuation category 2
- Rheumatoid arthritis or long-term corticosteroid therapy with history of or risk factors for nontraumatic fractures

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(1) Return every three months for injection
(2) Determine last menstrual period; ask about any concerns with bleeding pattern
(3) Assess for side effects/problems
(4) Consider assessing weight and counseling if woman concerned about weight change perceived to be associated with DMPA

8. Instructions for using the method
   a. Explain importance of adherence to three-month (13 weeks) injection schedule—contraceptive efficacy maintained for at least 14 weeks after injection
   b. Quick-start method—Administer first injection anytime if reasonably certain not pregnant; backup method for seven days if more than five days since LMP
   c. First day start—administer injection first day of menses; no backup method needed
   d. Counsel patients regarding possibility of irregular bleeding; use of backup contraception if more than three months between injections; use of condoms for STI/HIV prevention
   e. Late for injection
      (1) Can be given up to two weeks late (15 weeks from last injection) without needing additional contraceptive protection
      (2) If more than two weeks late (more than 15 weeks from last injection), give injection if reasonably certain patient is not pregnant; use backup method or abstain for seven days after injection
      (3) Might consider the use of EC (except for ulipristal acetate) if appropriate
   f. Procedure for injection
      (1) IM formulation—deep intramuscular injection in deltoid or gluteal muscle
      (2) SC formulation—anterior thigh or abdominal wall
      (3) Do not massage injection site (alters absorption/efficacy)
      (4) Observe patient for 20 minutes following first injection to rule out allergic reaction
   g. Warning signs
      (1) Frequent intense headache
Precautions and risks

- Contraindications for ECP—no CDC category three or four contraindications
- Contraindications for copper-releasing IUC—see the section titled "Intrauterine contraception (IUC)" earlier in this chapter

Management

- Health assessment prior to initiation of method
  - Individuals 17 years and older may purchase levonorgestrel ECP OTC, clinician may provide prescription or advance supply of any of the ECPs so the patient can begin taking it as soon as possible after unprotected sex
  - If clinician sees individual needing ECP may obtain health history—menstrual; first episode of unprotected sex in cycle to determine if should consider pregnancy test; last episode of unprotected sex to ensure within time frame for emergency contraception
  - If using IUC—see the section titled “Intrauterine contraception (IUC)” earlier in this chapter and examination
  - Discuss/provide ongoing contraception
  - Follow-up—no routine follow-up visit required

Instructions for using emergency contraception

- ECP
  - Take as soon as possible after unprotected sex and within 120 hours for maximum effectiveness
  - If using COC for emergency contraception, take in two doses 12 hours apart
  - If using COC for emergency contraception, consider taking antinausea medicine one hour before the first dose
  - If vomit within two hours of taking pills, may need a repeat dose
  - ECP will not provide any ongoing protection from pregnancy
  - Levonorgestrel ECPs or COCs—resume current method or begin new method immediately; wait until next day to start or restart oral contraceptives to prevent nausea/vomiting; abstain from sexual intercourse or use additional contraception with any hormonal method for seven days
  - UPA—ideally start hormonal method no sooner than five days after UPA as may reduce effectiveness; use additional contraception with any hormonal method for seven days
  - Advise patient to have a pregnancy test if no withdrawal bleed within three weeks of ECP
- Copper-releasing IUC (Copper T 380A)
  - Can be inserted up to five days after first unprotected sex since LMP
  - No evidence that progestin-releasing IUC offers effective emergency contraception

Vaginal spermicides

- Description—cream, foam, suppository, tablet, film, gel, or other preparation that destroys sperm when placed in vagina
- Mechanism of action
  - Nonoxynol-9 is active ingredient
  - Destroys sperm cell membrane
3. Effectiveness/first-year failure rate
   a. Perfect use—18%
   b. Typical use—28%
4. Advantages
   a. Accessible
   b. Inexpensive
   c. Readily available backup method
   d. No systemic effects
5. Disadvantages and side effects
   a. Coitally dependent
   b. Does not protect against STIs/HIV
   c. Potential for allergy, sensitivity, irritation
   d. Must follow instructions carefully for effective use
6. Contraindications (CDC categories 3 and 4)
   a. Category 4—do not use method if patient at high risk for HIV
      (relates to frequent spermicide use two or more times a day,
      vulvovaginal epithelium disruption, and theoretical increased
      susceptibility to HIV infection)
   b. Category 3—use of method not generally recommended for
      patient diagnosed with HIV/AIDS unless other, more appropriate
      methods are not available or acceptable (relates to frequent
      spermicide use, disruption of cervical mucosa, potential in-
      creased viral shedding, and HIV transmission)
7. Management
   a. No health assessment needed prior to initiation of method
   b. Individuals with skin sensitivities may want to test first or avoid
      use altogether
   c. Vaginal abnormalities (septa, prolapse) may preclude use
8. Instructions for using method
   a. Use spermicide with each act of intercourse
   b. Read all instructions carefully
   c. Leave spermicide in place (no douching) for at least six hours
      following last intercourse
   d. Follow instructions regarding how long prior to intercourse
      the spermicide may be inserted—if too much time has lapsed,
      pregnancy may occur
   e. Place spermicide deep within vagina
   f. Allow adequate time for spermicide to dissolve (if film, tablets,
      or suppositories)
   g. With foam use—shake canister well, as directed, prior to filling
      applicator
   h. Use with condom for increased effectiveness
   • Female condom
   1. Description—nitrile sheath placed in the vagina that acts as
      a barrier to prevent direct contact with seminal fluid during
      intercourse; smaller ring at closed end lies inside vagina and
      wider ring at open end of sheath remains outside the vagina; has
      silicone-based lubricant on inside
   2. Mechanism of action—barrier; protects vagina/vulva from direct
      contact with penis/semen
   3. Effectiveness/first-year failure rate
      a. Perfect use—5%
      b. Typical use—21%
4. Advantages
   a. Prevents/reduces transmission of STIs
   b. Does not require use of spermicide
   c. Accessible
   d. Controlled by the woman
   e. Stronger than latex and less likely to tear or break
   f. Does not require visit to healthcare provider
5. Disadvantages and side effects
   a. Coitally dependent
   b. May be aesthetically unappealing
   c. Expensive
6. Contraindications—nitrile allergy
7. Management
   a. No health assessment needed prior to initiation of method
   b. Women with vaginal anatomy abnormalities may not be able to use this method
8. Instructions for using the method
   a. Hold pouch with open end down—inner ring should be at bottom of pouch
   b. Squeeze inner ring together and insert inner ring and pouch into vagina
   c. Push inner ring deep into vagina
   d. Outer ring should rest outside vulva
   e. Remove condom immediately after intercourse
   f. Squeeze outer ring together and twist to prevent spillage
   g. Use new condom with each act of intercourse
   h. Do not use male condom when using female condom—may adhere together causing dislodgement

• Diaphragm
1. Description—reusable silicone dome that covers anterior vaginal wall, including cervix; spermicide placed in dome covers cervix, affording increased contraceptive protection; sizes 50-mm to 95-mm diameter; different types of inner construction of circular rim include:
   a. Flat spring
      (1) Good for women with firm vaginal tone
      (2) Gentle spring strength
   b. Coil spring
      (1) Good for women with average vaginal tone
      (2) Firm spring strength
   c. Arcing spring
      (1) Good for women with lax vaginal tone
      (2) Firm spring strength
   d. Wide seal
      (1) Good for women with average/lax vaginal tone
      (2) Available as arcing or coil spring
2. Mechanism of action
   a. Barrier—prevents direct cervical contact with seminal fluid
   b. Spermicide—destroys sperm cell membrane
3. Effectiveness/first-year failure rate
   a. Perfect use—6%
   b. Typical use—12%
4. Advantages
   a. Cost effective—may be used for one to two years
   b. Affords some protection against STIs—possible decreased incidence of PID
   c. No systemic effects
   d. May use with male condom for increased effectiveness
5. Disadvantages
   a. Requires sizing by trained clinician and instructions in use
   b. May have sensitivity to spermicide
   c. Increased risk of bacterial vaginosis and urinary tract infection (UTI)
      (1) Due to increased colonization with Escherichia coli
      (2) Related to use of spermicide
      (3) Mechanical irritation/compression against urethra
   d. Does not afford absolute protection from STIs/HIV
   e. Risk of toxic shock—2 to 3 per 100,000, per year
6. Contraindications (CDC categories 3 and 4)
   a. Category 4 for diaphragm use—do not use method if high risk for HIV—related to concerns about frequent spermicide use disrupting vaginal epithelium rather than diaphragm
   b. Category 3 for diaphragm use—use of method not generally recommended for the following conditions unless other, more appropriate methods are not available or acceptable:
      (1) History of toxic shock syndrome
      (2) HIV/AIDS—related to concerns about frequent spermicide use disrupting vaginal epithelium rather than diaphragm
7. Management
   a. Health assessment prior to initiation of method
      (1) Health history to determine whether special circumstances or contraindications
      (2) Vaginal examination to determine any abnormal anatomy (prolapse, cystocele, rectocele, vaginal septum) that may preclude proper fit and retention
      (3) Proper fit by trained clinician—determine appropriate size and type for woman's anatomy; choose largest size comfortable for individual woman: too small will not remain in place during intercourse, too large may cause discomfort, vaginal ulceration, and increased risk for UTI
      (4) Wait six weeks postpartum or until uterine involution complete and six weeks after second trimester abortion to fit and use
   b. Follow-up—no routine follow-up required; recheck fit following childbirth or if patient gains or loses 10 lbs or more
8. Instructions for using the method
   a. Insert just prior to intercourse or up to six hours before
   b. Coat inner dome with 1 tablespoon of spermicide
   c. Pinch sides of diaphragm and insert fully into vagina
      (1) Tuck anterior rim behind symphysis
      (2) Be certain that dome covers cervix
   d. If repeated intercourse, insert another application of spermicide in vagina; do not remove cervix
   e. Leave diaphragm in place for at least six hours following last intercourse
   f. Do not leave in place for more than 24 hours
   g. After each use, wash diaphragm with plain soap and water and store in clean, cool, dark environment; do not use talcum powder on diaphragm
   h. Do not use with oil-based lubricants or vaginal medications
   i. Replace diaphragm every one to two years
   j. Assess for holes and tears periodically by filling with water and inspecting for leaks
   k. Consider emergency contraception if diaphragm is dislodged during or less than six hours after sex
   l. Warning signs (toxic shock)
      (1) High fever
      (2) Nausea, vomiting, diarrhea
      (3) Syncope, weakness
      (4) Joint/muscle aches
      (5) Rash resembling sunburn
• Cervical cap (FemCap)
  1. Description—reusable silicone cap, fits over cervix, providing barrier contraception; spermicide placed in dome affords additional contraceptive efficacy; three sizes—22 mm, 26 mm, 30 mm; strap on convex side of cap aids in removal
  2. Mechanism of action
     a. Barrier—prevents direct cervical contact with seminal fluid
     b. Spermicide—destroys sperm cell membrane
  3. Effectiveness/first-year failure rate
     a. Perfect use
        (1) Parous women—21%
        (2) Nulliparous women—10%
     b. Typical use
        (1) Parous women—40%
        (2) Nulliparous women—20%
  4. Advantages
     a. Cost-effective—may be used for one to two years
     b. Affords some protection against STIs
     c. Possible decreased incidence of PID
     d. Possible decreased incidence of cervical dysplasia/neoplasia
     e. No systemic effects
     f. May be left in place for 48 hours
     g. Does not require insertion of more spermicide with repeat intercourse
     h. Does not increase incidence of bladder infection
     i. May use with male condom to increase effectiveness
  5. Disadvantages
     a. Requires trained clinician for sizing
     b. May have sensitivity to silicone or spermicide
     c. Not every woman can be fitted appropriately—short cervix, asymmetry
     d. May become dislodged during intercourse
  6. Contraindications (CDC categories 3 and 4)
     a. Category 4 for cervical cap use—do not use method if high risk for HIV exists; related to concerns about frequent spermicide use disrupting vaginal epithelium rather than the cervical cap
     b. Category 3 for cervical cap use—use of method not generally recommended for the following conditions unless other, more appropriate methods are not available or acceptable:
        (1) HIV/AIDS—related to concerns about frequent spermicide use disrupting vaginal epithelium rather than the cervical cap
        (2) History of toxic shock syndrome
  7. Management
     a. Health assessment prior to initiation of method
        (1) Visualization of cervix to rule out abnormalities/anatomy that may prevent proper fit—extensive lacerations, asymmetry, short cervix
        (2) Palpation of cervix—length, position, symmetry
        (3) Size generally determined by obstetric history—smallest size if never pregnant, middle size if miscarried or had cesarean section, largest size if had vaginally delivered full-term baby
        (4) Wait six weeks postpartum or until uterine involution complete and six weeks after second trimester abortion to fit and use
     b. Follow-up—no routine follow-up required; reevaluate cap fit if patient complains of dislodgement during intercourse
     c. Special considerations—do not use less than six weeks postpartum, immediate postabortion, or during menses
  8. Instructions for using method
     a. Insert cap at least 30 minutes prior to intercourse to create suction
     b. Fill one-third of cap with spermicide
     c. Compress rim prior to insertion
     d. Advance into vagina so rim can slide over cervix
     e. Check that cap covers cervix
     f. Not necessary to reinsert spermicide with repeated intercourse
     g. Leave in place for at least six hours and no more than 48 hours after sex
     h. Warning signs (toxic shock)—refer to the section titled “Diaphragm” earlier in this chapter
     i. Do not use after recent spontaneous or induced abortion
     j. Do not use during menses or any other vaginal bleeding
• Contraceptive sponge
  1. Description—small, pillow-shaped polyurethane sponge containing 1 g of nonoxynol-9 spermicide; concave side fits over cervix; polyester loop facilitates removal; one size
  2. Mechanism of action
     a. Barrier—prevents direct cervical contact with seminal fluid
     b. Spermicide—destroys sperm cell membrane
  3. Effectiveness/first-year failure rate
     a. Perfect use
        (1) Nulliparous—9%
        (2) Parous—20%
     b. Typical use
        (1) Nulliparous—12%
        (2) Parous—24%
  4. Advantages
     a. No prescription required
     b. No systemic effects
     c. May be used with male condom for additional contraceptive and STI protection
     d. Protects up to 24 hours regardless of how many times intercourse occurs
  5. Disadvantages
     a. Significant decrease in efficacy for parous women versus nulliparous woman
     b. Potential risk of toxic shock—same as with diaphragm
     c. May have sensitivity to polyurethane or spermicide
     d. Abnormal vaginal anatomy (prolapse, cystocele, rectocele) may prevent proper placement
  6. Contraindications (CDC recommendations not specifically provided)—consider same as for diaphragm and cervical cap
  7. Management
     a. No health assessment needed prior to initiation of method
     b. Wait six weeks postpartum to use
  8. Instructions for using method
     a. Moisten sponge with tap water prior to use
     b. Insert deep into vagina
Couples unwilling to abstain during fertile time period
Health assessment prior to initiation of method
Abstain from intercourse during menses because of History to reflect pattern of menses
Perfect use
Follow-up—BBT/sympto-thermal chart evaluation
Mechanism of action—intercourse is avoided during fertile period
Description—method of contraception for women who are breast
If repeated intercourse, no additional spermicide needed
Do not wear the sponge for more than 24 to 30 hours
Discard sponge after use
Do not use after recent spontaneous or induced abortion
Do not use during menses or any other vaginal bleeding
Warning signs (toxic shock)—refer to the section titled “Diaphragm” earlier in this chapter

- Fertility awareness methods
  1. Description—method of contraception using abstinence during estimated fertile period based on all or some of the following methods
     a. Menstrual cycle pattern (calendar method)
     b. Basal body temperature (BBT)—determines ovulation
     c. Evaluation of cervical mucus (ovulation/Billings method)—determines ovulation
     d. Sympto-thermal method—combines BBT with evaluation of cervical mucus and cervical position/consistency
     e. Standard days method—consider fertile days 8 through 19 of each menstrual cycle
  2. Mechanism of action—intercourse is avoided during fertile period
     a. Ovum remains fertile for 24 hours
     b. Sperm viability approximately 72 hours
     c. Most pregnancies occur when intercourse occurs before ovulation
  3. Effectiveness/first-year failure rate
     a. Perfect use
        (1) Calendar method—9%
        (2) BBT—2%
        (3) Ovulation method—3%
        (4) Sympto-thermal—0.4%
        (5) Standard days method—5%
     b. Typical use for all methods—24%
  4. Advantages
     a. Minimal cost
     b. Natural
     c. No systemic effects
     d. No localized side effects, for example, latex allergy
     e. Can be utilized for contraception and conception planning
  5. Disadvantages
     a. Requires motivation from both partners
     b. Requires periodic abstinence
     c. No protection against STIs/HIV
  6. Precautions and risks
     a. Not reliable for women with the following conditions:
        (1) Irregular menses (consider sympto-thermal and ovulation methods)
        (2) Perimenopausal
        (3) Recently postpartum
        (4) Have had recent menarche
     b. Not a suitable method for
        (1) Women who cannot accurately evaluate their fertile period
           (a) Inability to use/read thermometer
           (b) Inability to understand cervical mucus/changes
           (c) Inability to time intercourse based on calendar evaluation
     (2) Couples unwilling to abstain during fertile time period
     (3) If nonconsensual coitus is likely to occur
  7. Management
     a. Health assessment prior to initiation of method
        (1) History to reflect pattern of menses
        (2) Evaluation of client’s willingness/ability to check cervical mucus/consistency/position
     b. Follow-up—BBT/sympto-thermal chart evaluation
  8. Instructions for using the method
     a. Calendar method
        (1) Keep record of menstrual cycle intervals for several months
        (2) From the shortest cycle length, subtract 18 days—this determines first fertile day
        (3) From the longest cycle length, subtract 11 days—this determines last fertile day
        (4) Use these numbers to determine days of abstinence for every cycle
     b. Basal body temperature (BBT) method
        (1) Take temperature each morning before rising
           (a) BBT thermometer
           (b) Temperature can be oral, vaginal, or rectal (maintain same route)
        (2) Record on BBT chart
        (3) Temperature increase of 0.4°F or higher at ovulation—remains elevated for at least three days
        (4) Abstain from intercourse until three-day temperature increase occurs
     c. Ovulation method
        (1) Inspect cervical mucus/secretions on underwear, toilet tissue, with fingers, beginning day after menses
        (2) Determine consistency—elastic, slippery, wet by touch indicates preovulatory
           (a) Amount increases; becomes thinner and more elastic around time of ovulation
           (b) After ovulation, mucus becomes thick, tacky, and cloudy
        (3) Abstain from intercourse during “wet days” at onset of increased, slippery, thin mucus discharge until four days past the peak day (last day of clear, stretchy, slippery secretions)
        (4) Abstain from intercourse during menses because of inability to assess mucus
     d. Sympto-thermal method—combines cervical mucus evaluation, BBT, and assessment of consistency/position of cervix in vagina
        (1) May also use calendar method and other symptoms such as ovulatory pain (“mittelschmertz”) as additional indicators
        (2) Abstain until last combined methods indicates “safe” time
     e. Standard days method
        (1) Abstain from intercourse days 8 through 19 of each menstrual cycle
        (2) CycleBeads are color-coded string of beads to help woman keep track of cycle days

- Lactational amenorrhea method
  1. Description—method of contraception for women who are breastfeeding without supplementation or with minimal supplementation and have not had a postpartum menstrual cycle
2. Mechanism of action—high prolactin
   a. FSH normal; LH decreased—no ovarian follicular development
   b. Inhibits pulsatile GnRH
   c. Results in anovulation
3. Effectiveness/first-year failure rate
   a. Perfect use—0.5% to 1.5% (if amenorrheic)
   b. Typical use—data not available
4. Advantages
   a. Requires no devices
   b. No systemic effects
   c. No expense
   d. May result in decreased transmission of HIV (man to woman)
5. Disadvantages and side effects
   a. Requires self-control on part of male partner
   b. Requires ability to predict time of ejaculation
   c. Does not afford protection from STIs
6. Precautions and risks—should not be used by men with premature ejaculatory disorder
7. Management—no health assessment needed prior to initiation of method
8. Instructions for using the method
   a. Male partner should void prior to intercourse
   b. Withdraw penis prior to ejaculation; do not ejaculate near female’s external genital area
   c. If intercourse is going to be repeated in short period of time, male should urinate again and wipe tip of penis to remove any sperm remaining from previous intercourse
   d. Although preejaculate itself contains little or no sperm, repeated intercourse may result in increased amounts of sperm in the preejaculatory fluid
• Abstinence
1. Description—contraception based on abstaining from penile-vaginal intercourse
2. Mechanism of action—sperm not introduced into vagina
3. Effectiveness/first-year failure rate
   a. Perfect use—0%
   b. Typical use—data not available
4. Advantages
   a. No cost
   b. Prevention of STIs
5. Disadvantages—requires motivation and acceptance by both partners
6. Management—no health assessment needed prior to initiation of method
7. Instructions for using the method
   a. Avoid any penile-vaginal contact
   b. Consider alternative means of intimacy/sexual expression (e.g., mutual masturbation, massage, kissing)
   c. Penile-anal intercourse may result in some sperm entering vagina during withdrawal
   d. Penile-anal, oral-genital, and digital-genital contact may result in STI/HIV transmission
   e. Avoid alcohol or drug use; may affect commitment to method
• Female sterilization
1. Description—permanent contraception for woman achieved through surgical means; commonly performed on outpatient basis or postpartum prior to discharge
2. Mechanism of action
   a. Fallopian tubes are obstructed to prevent union of sperm and ovum
b. Transabdominal occlusion methods—laparoscopy or suprapubic minilaparoscopy approach; general or local anesthesia
   (1) Surgical ligation—Pomeroy procedure
   (2) Surgical ligation and attachment to uterine body—Irving procedure
   (3) Electrocauterization
   (4) Section of tube excised
      (a) Pritchard procedure
      (b) Fimbriectomy
   (5) Occluded—compressed with silastic band (Falope Ring) or clip (Filshie)
c. Transcervical occlusion methods (Essure)
   (1) Micro-insert device inserted in tubes transcervically through hysteroscope
   (2) Office procedure with local anesthesis
3. Effectiveness/first-year failure rate
   a. Perfect use—0.5%
   b. Typical use—0.5%
4. Advantages
   a. Affords permanent contraception
   b. Highly effective
   c. Cost-effective over long term
   d. Not coitally dependent
5. Disadvantages
   a. Invasive surgical procedure requiring anesthesis
   b. Reversal is difficult, expensive, and often unsuccessful
   c. No protection against STIs/HIV
   d. Initially expensive
   e. Probability of pregnancy being ectopic is higher if method fails
6. Precautions and risks
   a. Surgical procedure
      (1) Operative complications—bladder/uterine/intestinal injury may occur
      (2) Anesthetic complications—death (rare)
   b. Wound infection
   c. If pregnancy occurs following procedure, increased risk of the pregnancy being ectopic
7. Management
   a. Health assessment prior to initiation of method
      (1) Assess if patient candidate for surgery
      (2) Assess psychological readiness for permanent contraceptive method
      (3) Follow federal and state regulations regarding informed consent process
   b. Follow-up—assess for appropriate healing and signs and symptoms of infection one to two weeks after procedure
8. Instructions for using the method
   a. Nothing by mouth at least eight hours prior to procedure
   b. Need transportation assistance from hospital or clinic to home
   c. Rest for at least 24 hours recommended following procedure
   d. Light lifting only for one week
   e. No coitus for one to two weeks
   f. Notify healthcare provider of any signs and/or symptoms of infection
   g. Continue another method of contraception for three months after transcervical occlusion method
   h. Confirm correct placement and tubal occlusion with hysterosalpingogram three months after transcervical occlusion method
   i. If suspect pregnancy, see healthcare provider as soon as possible to evaluate for possible ectopic pregnancy
• Male sterilization
1. Description—permanent contraception involving occlusion of vas deferens, preventing transmission of sperm through semen
   a. Approaches to vas deferens
      (1) Conventional vasectomy—local anesthesia; skin and muscle overlying vas deferens is incised with scalpel, vas deferens is occluded, and incisions are closed with absorbable suture
      (2) No-scalpel vasectomy—local anesthesia; ringed clamp secures vas deferens, midline puncture of scrotum with dissecting forceps rather than incision; vas deferens occluded; sutures not needed; less risk of infection, hematoma, pain than conventional method
   b. Methods of occlusion
      (1) Ligation with sutures and excision of section of vas deferens most common
      (2) Other methods include electrosurgical or thermal cautery, application of clips, or a combination of methods
2. Mechanism of action—sperm not present in ejaculate
3. Effectiveness/first-year failure rate
   a. Perfect use—0.10%
   b. Typical use—0.15%
4. Advantages
   a. Cost-effective
   b. Highly effective
   c. Affords permanent contraception
   d. Not coitally dependent
   e. No systemic effects/artificial devices
5. Disadvantages
   a. Initial expense
   b. Should be considered irreversible
   c. Invasive surgical procedure
   d. No protection against STIs/HIV
6. Precautions and risks
   a. Surgical procedure
   b. Wound infection
   c. Prostate cancer—conflicting studies; those that were positive show only weak association of vasectomy and prostate cancer; prostate cancer screening recommendations in men who have had vasectomy is same as for men in general population
7. Management
   a. Health assessment prior to initiation of procedure
      (1) Assess psychological readiness for permanent contraceptive method
      (2) Assess general health and inguinal area, scrotum, and testicles
      (3) Follow federal and state regulations regarding informed consent process
Initiation of intrauterine contraception—lactating, nonlactating, including postcesarean delivery
(1) Less than 10 minutes after delivery of placenta—LNG IUS (CDC category 2), copper-releasing IUC (CDC category 1)
(2) Ten minutes after delivery of placenta to less than four weeks (both CDC category 2)
(3) Four weeks or greater postpartum (both CDC category 1)

2. Contraception for women older than 40 years
a. Most contraceptive options safe for women older than 40 without category 3 or 4 contraindications
b. Combination hormonal contraception (CHC)—pills, patch, vaginal ring
(1) Safe option for nonsmoking, nonobese, healthy perimenopausal women
(2) Noncontraceptive benefits may be especially attractive to the perimenopausal woman—relief of vasomotor symptoms, menstrual regulation
(3) May reduce risk of endometrial hyperplasia/cancer associated with anovulatory cycles during perimenopausal years
c. Progestin-only methods (DMPA, POPs, implants)
(1) No specific age-related contraindications
(2) May provide some relief from vasomotor symptoms
(3) May reduce risk of endometrial hyperplasia/cancer
(4) DMPA may diminish bone mineral density in perimenopausal women; however, these women do not undergo the typical rapid loss of bone mineral density following menopause
d. Intrauterine contraceptives
(1) Long-acting reversible method option as effective as sterilization
(2) LNG IUS may also be therapeutic for perimenopausal women with heavy bleeding
e. Barrier methods—safe option
f. Sterilization—most prevalent contraceptive method among married women in United States
g. Fertility awareness methods—may be less effective during perimenopause because of irregular ovulation and menstrual cycles
h. Approaches used in deciding when to discontinue contraception
(1) There are no definitive answers for when to discontinue contraception
(2) CHC
   (a) Continue to age 50–55 years
   (b) Must be off method for 14 days to eliminate effect on FSH and estradiol levels
   (c) FSH and estradiol levels are unreliable predictors because of normal fluctuations seen during perimenopause
(3) Progestin-only method including LNG IUS—two options
   (a) Continue until age 55
   (b) At age 50–54, check FSH on two occasions at least one to two months apart; if both levels are ≥ 30 mIU/mL, continue method one more year and then stop
(4) Nonhormonal methods—copper-releasing IUC and barrier methods are two options
   (a) Continue until amenorrhea for one year
   (b) If younger than age 50, continue until amenorrhea for two years or one year of amenorrhea and 2 FSH levels ≥ 30 mIU/mL at least one to two months apart
• Abortion

1. Medication abortion—FDA approved up to 70 days from last menstrual period
   a. Mifepristone plus misoprostol
      (1) Mifepristone—19-norsteroid, progesterone antagonist
         (a) Blocks action of progesterone needed to establish and maintain placental attachment
         (b) Softens cervix
         (c) Stimulates prostaglandin synthesis by cells of early decidua
      (2) Misoprostol—prostaglandin analog
         (a) Softens cervix
         (b) Stimulates uterine contractions
         (c) Common short-term side effects—nausea, vomiting, diarrhea, temporary elevation of body temperature
         (d) Prenatal exposure to misoprostol associated with major congenital anomalies, absolute risk low (about 1%)
      (3) Ninety-six percent to 98% effective through nine weeks of gestation (oral mifepristone 200 mg followed by buccal misoprostol 800 mcg regimen)
   b. Methotrexate plus misoprostol—less commonly used
      (1) Methotrexate—folic acid analog
         (a) Inhibits enzyme necessary for DNA synthesis
         (b) Acts on rapidly dividing cells of placenta
      (2) Ninety-two percent to 96% effective through 49 days of gestation
      (3) May take up to one month for expulsion of gestational sac
   c. Counseling
      (1) Discuss all pregnancy options
      (2) Discuss options for termination—medication, surgical

2. Surgical methods
   a. Vacuum aspiration (first trimester)
      (1) Suction curettage
      (2) Local anesthetic
   b. Dilation and evacuation (D&E)—can be performed up to 20 weeks' gestation

3. Pre-abortion health assessment and counseling
   a. History
      (1) LMP and menstrual history
      (2) Surgical history including gynecologic surgeries
      (3) Contraceptive history
      (4) Medical history
      (5) Current medications/history of allergic responses
   b. Physical examination
      (1) Size of uterus
      (2) Note uterine/cervical position
      (3) Presence of uterine/cervical/adnexal abnormalities
         (a) Fibroids
         (b) Adnexal masses (rule out ectopic)
      (4) Laboratory tests
         (a) Pregnancy test—urine/serum
         (b) Hgb/Hct
         (c) Blood type and Rh
         (d) STI evaluation if warranted (e.g., sexual assault/patient concern)
   c. Counseling
      (1) Discuss all pregnancy options
      (2) Discuss options for termination—medication, surgical

4. Postabortion health assessment and counseling
   a. Contraceptive counseling
   b. Rh immunization if patient Rh negative—give at time of surgical procedure or first visit with medication abortion
   c. Prophylactic antibiotics may be given to surgical patients
   d. Tissue examined to rule out molar pregnancy

5. Potential postabortion complications
   a. Infection
   b. Retained products of conception
   c. Trauma to uterus/cervix
   d. Excessive bleeding
   e. Warning signs
      (1) Fever
      (2) Persistent/increasing lower abdominal pain
      (3) Prolonged/excessive vaginal bleeding
      (4) Purulent vaginal discharge
      (5) No return of menses within six weeks
Questions

Select the best answer.

1. Which of the following actions does the estrogen in combination oral contraceptives (COCs) include?
   a. Inhibits ovulation through suppression of the LH surge
   b. Inhibits sperm penetration by thickening cervical mucous
   c. Provides most of the contraceptive effect for COCs
   d. Stabilizes the endometrium for less unscheduled bleeding

2. According to ACOG guidelines, which of the following physical examination and screening tests should be part of the routine well-woman visit every year for females ages 30 to 39 years?
   a. Chlamydia test
   b. Clinical breast examination
   c. Mammogram
   d. Pap test

3. The most prevalent contraceptive method among married women in the United States is:
   a. combination oral contraceptives.
   b. condoms.
   c. sterilization.
   d. withdrawal.

4. The woman taking ulipristal acetate for emergency contraception because she was late starting a new pack of her combination oral contraceptive (COC) and had unprotected sex should be advised to:
   a. abstain from sex or use a barrier method for five days and then restart her COCs.
   b. abstain from sex or use a barrier method until her menses and then restart her COCs.
   c. restart her COCs the next day; no backup method is needed.
   d. restart her COCs the next day and use a backup method for seven days.

5. A model that can be used by clinicians who are not sex therapists to address sexual concerns and make appropriate referrals is the:
   a. Basson nonlinear model.
   b. Cisgender model.
   c. Masters and Johnson linear model.
   d. PLISSIT model.

6. The polypeptide hormone produced by the ovaries that stimulates FSH production is:
   a. activin.
   b. follistatin.
   c. inhibin.
   d. prolactin.

7. The sebaceous glands located within the areola are called:
   a. Bartholin's glands.
   b. Cowper's glands.
   c. Montgomery's glands.
   d. Skene's glands.

8. The lymph nodes that drain directly into the infraclavicular nodes are the:
   a. central nodes.
   b. lateral nodes.
   c. subscapular nodes.
   d. supraclavicular nodes.

9. A vaginal pH less than 4.5 is an expected finding in a:
   a. healthy reproductive-age woman.
   b. menopausal woman with atrophic vaginitis.
   c. reproductive-age woman with trichomoniasis.
   d. healthy prepubertal-age girl.

10. The predominant vaginal organism responsible for an acidic pH is:
    a. Doderlein bacilli.
    b. Gardnerella.
    c. Haemophilus.
    d. Lactobacilli.

11. Squamous metaplasia of the cervix occurs within the:
    a. columnar epithelium.
    b. internal cervical os.
    c. squamous epithelium.
    d. transformation zone.

12. Which of the following is true concerning the luteal phase of the menstrual cycle?
    a. It begins at the time of the LH surge.
    b. It corresponds with the uterine proliferative phase.
    c. There is thickened cervical mucus.
    d. It lasts an average of 10 days from the time of ovulation to menses.

13. Estrogen is released by the ovary in response to:
    a. FSH.
    b. GnRH.
    c. hCG.
    d. LH.

14. The predominant estrogen after menopause is:
    a. estradiol.
    b. estriol.
    c. estrone.
    d. estropipate.

15. Which of the following androgens can be converted to estradiol?
    a. Androstenedione
    b. Cortisol
    c. DHA
    d. Testosterone

16. Which phase of the menstrual cycle is the most variable?
    a. Follicular
    b. Luteal
    c. Ovarian
    d. Secretory

17. Which hormone is dominant during the proliferative phase of the menstrual cycle?
    a. Estrogen
    b. LH
    c. Progesterone
    d. Prolactin

18. Initial management for a 30-year-old woman whose brother had breast cancer should be:
    a. discuss having a risk-reducing bilateral mastectomy.
    b. discuss starting on a selective estrogen receptor modulator.
    c. encourage her to have her son tested for BRCA1/BRCA2 mutation.
    d. refer her for genetic counseling and possible genetic testing.
19. A premenopausal woman with which of the following conditions would be mostly likely to have a low FSH and a low estradiol level?
   a. Adrenal tumor
   b. Anorexia nervosa
   c. Premature ovarian failure
   d. Turner's syndrome

20. Which of the following statements about prolactin is correct?
   a. It is produced by the placenta during pregnancy.
   b. It is secreted by the posterior pituitary gland.
   c. It stimulates the breast milk reflex with suckling.
   d. It stimulates synthesis of milk proteins in mammary glands.

21. A female who was sexually assaulted three weeks ago by a male known to be HIV positive has a nonreactive rapid EIA test using an oral mucosal transudate specimen. The most appropriate next step would be to:
   a. advise her to return for repeat testing in three months.
   b. repeat the rapid EIA test now using a blood sample.
   c. order an HIV-1 p24 antigen test.
   d. order a Western blot test to confirm the nonreactive EIA test result.

22. Adding potassium hydroxide (KOH) to a wet-mount slide before viewing it under the microscope is useful in the detection of:
   a. clue cells.
   b. pseudohyphae.
   c. trichomonads.
   d. white blood cells.

23. A 45-year-old-female is concerned that she may be pregnant because she is 12 days late for her period. The best initial pregnancy test to obtain is:
   a. qualitative sensitive urine hCG test.
   b. qualitative serum hCG test.
   c. quantitative sensitive urine hCG test.
   d. quantitative serum hCG test.

24. The American Cancer Society recommends yearly mammogram screening beginning at age:
   a. 40.
   b. 45.
   c. 50.
   d. 55.

25. A woman who was treated for primary syphilis one year ago now has the following test results: VDRL nonreactive and FTA-ABS positive. These findings indicate that she most likely:
   a. was not adequately treated for her primary syphilis one year ago.
   b. has become reinfected since her treatment one year ago.
   c. has some other condition that is causing a false-positive FTA-ABS.
   d. was treated adequately for her syphilis and has not become reinfected.

26. When evaluating cervical mucus, the term *spinnbarkeit* refers to:
   a. amount.
   b. cellularity.
   c. clarity.
   d. elasticity.

27. A 24-year-old female presents to your office with a request for combination oral contraceptives. Her current medications include a bronchodilator for asthma. Management for this client should include advising her that:
   a. combination oral contraceptives are not recommended for women with asthma.
   b. combination oral contraceptives may potentiate the action of her bronchodilator.
   c. she should use a backup method if using the bronchodilator several days in a row.
   d. progestin-only contraceptive injections may reduce her asthma attacks.

28. Which of the following contraceptive methods would be best for a woman with a seizure disorder who is taking phenytoin?
   a. Combination oral contraceptives
   b. Transdermal contraceptive patch
   c. Progestin-only oral contraceptives
   d. Progestin-only contraceptive injections

29. A client calls the clinic on Tuesday morning. She had unprotected sex Friday night and is interested in emergency contraception. Appropriate information for this client would include which of the following?
   a. Emergency contraception pills are very effective for a medication abortion in early pregnancy.
   b. If she is not midcycle when she had sex, she does not need emergency contraception.
   c. It is too late for emergency contraceptive pills, but insertion of an IUC is an option.
   d. She can use emergency contraception pills even if she has had other unprotected sex since her last period.

30. The levonorgestrel-releasing IUC may be a better choice than the copper-releasing IUC for a woman who:
   a. has never been pregnant.
   b. has dysmenorrhea.
   c. is currently breastfeeding.
   d. is sure she does not want more children.

31. A 28-year-old female who has had an IUC for two years has a Pap test showing actinomycosis. She has no symptoms of infection. Appropriate management would include:
   a. removing the IUC and repeating the Pap test in six months.
   b. removing the IUC, treating with doxycycline, and repeating the Pap test in one year.
   c. keeping the IUC and repeating the Pap test in three years.
   d. keeping the IUC, treating with doxycycline, and repeating the Pap test in three months.

32. Which of the following diaphragms would be best for a woman with very firm vaginal tone?
   a. Arcing spring
   b. Coil spring
   c. Flat spring
   d. Wide seal

33. The type of skin lesion seen initially with toxic shock syndrome is:
   a. diffuse sunburn-like rash.
   b. multiple vesicles on chest and extremities.
   c. petechiae on mucocutaneous tissues.
   d. ulcerative lesions in genital area.

34. Advantages of the cervical cap over the diaphragm include which of the following?
   a. It is has a lower failure rate.
   b. It is easier to insert.
   c. It can remain in place for 48 hours.
   d. Spermicide is not needed.

35. Which of the following statements concerning a transcervical (Essure) sterilization procedure is correct?
   a. The fallopian tubes are occluded with a silastic band.
   b. The success of reversals is higher than with other sterilization methods.
c. It is effective within one to two weeks after the procedure.
d. The patient needs to return for a hysterosalpingogram three months after the procedure.

36. The main mechanism of action of misoprostol in medically induced abortion is:
   a. blocking the action of progesterone.
   b. inhibiting enzymes necessary for DNA synthesis.
   c. stimulating synthesis of prostaglandin by cells of the early decidua.
   d. stimulating uterine contractions.

37. Potential disadvantages of progestin-only implants include which of the following?
   a. Side effects may be increased in women who are underweight.
   b. They may cause a significant decrease in bone mineral density.
   c. They may cause irregular bleeding and spotting.
   d. Return to fertility after discontinuation may take several months.

38. The CDC-recommended test for Chlamydia is:
   a. nucleic acid amplification test (NAAT).
   b. polymerase chain reaction (PCR) test.
   c. tissue culture.
   d. Tzanck preparation test.

39. Which endogenous estrogen is known as the “estrogen of pregnancy”?
   a. Estradiol
   b. Estriol
   c. Estrone
   d. Estropipate

40. Increased production of ____________ is associated with primary dysmenorrhea.
   a. androstenedione
   b. arachidonic acid
   c. cortisol
   d. prostaglandin

41. An 18-year-old female presents with genital warts. Appropriate tests to consider at this visit include:
   a. Chlamydia test.
   b. HPV test.
   c. Pap test.
   d. type-specific herpes serologic test.

42. A woman who had an intrauterine contraceptive (IUC) placed three months ago returns to the office with complaint of cramping and states the IUC thread feels longer to her. You determine that she likely has a partial IUC expulsion. Appropriate management if she wants to continue with an IUC as her contraceptive method includes:
   a. remove the IUC, place a new IUC at the current visit, and start her on doxycycline for five to seven days.
   b. remove the IUC and instruct her to return at her next menses for placement of a new IUC.
   c. start her on doxycycline and have her return in one week to remove the IUC and replace with a new IUC.
   d. use sterile forceps to move the IUC so it is back at the fundus of the uterus.

43. A woman calls the office to ask what to do because she noticed this morning that her contraceptive patch had come off, although she was able to reapply it easily. She knows it was fully attached last evening before she and her partner had sex. Appropriate advice would include that she should:
   a. remove the current patch, apply a new one, and use a backup method for seven days.
   b. keep the current patch on if it adheres well and consider emergency contraception.
   c. remove the current patch, start her patch-free week now, and then apply a new patch.
   d. keep the current patch on if it adheres well and keep her same patch-change day.

44. A woman who is requesting contraception and who also wants to get pregnant in one year should avoid using:
   a. combination oral contraceptives.
   b. fertility awareness methods.
   c. progestin-only oral contraceptives.
   d. progestin-only contraceptive injections.

45. A woman plans to use the calendar method for contraception. She has charted her menstrual cycles for several months and has noted her longest cycle to be 30 days and her shortest cycle to be 27 days. She should abstain from sexual intercourse each cycle from day ______ through day ______.
   a. 9; 19
   b. 10; 15
   c. 11; 18
   d. 12; 16

46. Which of the following statements by a client indicates that she needs additional information about use of the contraceptive vaginal ring?
   a. “I should insert a new ring every seven days.”
   b. “I should expect to have regular periods while using the ring.”
   c. “My partner can use a male condom while I am wearing the ring.”
   d. “The exact position of the ring in the vagina is not important.”

47. According to the CDC, initiating progestin-only contraceptive injections (DMPA) is a category 3 when which of the following conditions exists?
   a. Age 35 years or older and smoking more than 15 cigarettes daily
   b. History of deep vein thrombosis or pulmonary emboli
   c. Unexplained vaginal bleeding prior to evaluation
   d. Use of drugs that alter liver enzymes

48. A four-week-postpartum woman who is breastfeeding on demand without supplements presents in your office to discuss her contraceptive options. She plans to continue breastfeeding for at least six months. Information for this woman concerning the lactational amenorrhea method of contraception should include which of the following?
   a. The expected failure rate for this method of contraception is about 20%.
   b. This method is considered effective for only three months postpartum.
   c. The woman can rely on this method as long as she is not having periods.
   d. Another method of contraception should be considered when the infant begins sleeping through the night.

49. A four-week-postpartum woman who is breastfeeding now and plans to start weaning the baby in the next month is in your office to discuss her contraceptive options. She has a BMI of 35 (obese). Of the following, the best contraceptive choice for her at this time would be:
   a. combination oral contraceptives.
   b. fertility awareness method.
   c. lactational amenorrhea method.
   d. progestin-only pills.
50. A woman using a diaphragm for contraception has sexual intercourse at 8:00 p.m. on Friday, at 2:00 a.m. on Saturday, and again at 8:00 a.m. on Saturday. When can she safely remove her diaphragm for effective contraception while minimizing problems related to leaving the diaphragm in for extended periods of time?
   a. 10:00 a.m. on Saturday
   b. 2:00 p.m. on Saturday
   c. 10:00 p.m. on Saturday
   d. 8:00 a.m. on Sunday

51. An individual who either has acute active hepatitis B infection or who is a carrier (chronic active state) would have a positive test for:
   a. hepatitis B surface antigen.
   b. hepatitis B surface antibody.
   c. hepatitis B e-antigen.
   d. hepatitis B e-antibody.

52. The area located between the fourchette anteriorly and the anus posteriorly is the:
   a. levator ani.
   b. perineum.
   c. prepuce.
   d. vestibule.

53. A 58-year-old female has a bone densitometry test, with the results of T-score –2.0. This indicates that she has:
   a. bone density that is greater than that of most women her age.
   b. bone density that is equal to that of a young normal adult.
   c. bone loss that is at the level for a diagnosis of osteopenia.
   d. bone loss that is at the level for a diagnosis of osteoporosis.

54. A female patient presents with no symptoms, but she is concerned because she had sexual intercourse three weeks ago with a new partner who has recently told her he had a history of genital herpes. She wants to know if there is a test she can have at this visit to see if she has been infected. The best response would be which of the following?
   a. A Pap test can be done at this visit that will show if she has been infected.
   b. A blood test can be done at this visit to see if she has been recently infected.
   c. If she does not develop lesions in the next four to eight weeks, she is not infected.
   d. She can have a blood test in one to two months to determine whether she has herpes antibodies.

55. The anatomic area that contains the urethral/vaginal openings, hymen, Skene’s glands, and Bartholin’s glands is called the:
   a. labia majora.
   b. perineum.
   c. vestibule.
   d. vulva.

56. Findings on a pelvic examination of a 25-year-old nulliparous female include uterus 8 cm in length, right ovary 3 cm × 2 cm, and left ovary not palpable. These findings indicate a(n):
   a. normal uterus, normal ovaries.
   b. normal uterus, enlarged right ovary.
   c. enlarged uterus, normal ovaries.
   d. enlarged uterus, enlarged right ovary.

57. Which of the following occurs first during female puberty?
   a. Beginning breast development
   b. Beginning pubic hair development
   c. Growth spurt peak
   d. Menstruation

58. Which of the following structures produces gonadotropin-releasing hormone (GnRH)?
   a. Anterior pituitary gland
   b. Hypothalamus
   c. Posterior pituitary gland
   d. Ovaries

59. Which of the following list of events is in the correct chronological order?
   a. LH surge, ovulation, rise in BBT, thickened cervical mucus
   b. Ovulation, LH surge, thickened cervical mucus, rise in BBT
   c. Rise in BBT, thickened cervical mucus, ovulation, LH surge
   d. Thickened cervical mucus, rise in BBT, LH surge, ovulation

60. According to CDC recommendations, which of the following would be considered a category 4 condition for the indicated contraceptive method?
   a. Levonorgestrel IUC for woman with endometriosis
   b. Copper IUC for woman with history of breast cancer
   c. Progestin-only pills for woman with past history of deep vein thrombosis
   d. Vaginal contraceptive ring for woman older than 35 years of age who smokes one pack of cigarettes per day

61. An advantage of the female condom is that it:
   a. can be used with a male condom for added protection.
   b. can be used for repeated acts of intercourse.
   c. may be used by individuals with latex allergy.
   d. has a lower failure rate than the male condom does.

62. Noncontraceptive benefits of combination oral contraceptives include all of the following except:
   a. decrease in risk for benign breast disease.
   b. decrease in risk for cervical cancer.
   c. decrease in risk for endometrial cancer.
   d. decrease in risk for ovarian cancer.

63. For which of the contraceptive methods is there the least difference between the perfect use and typical use failure rates?
   a. Combination oral contraceptives
   b. Diaphragm
   c. Intrauterine contraceptive
   d. Male condom

64. A woman who weighs 200 lbs or more may have decreased effectiveness with which of the following contraceptive methods?
   a. Progestin-only injectable contraception
   b. Contraceptive vaginal ring
   c. Levonorgestrel intrauterine system
   d. Transdermal contraceptive system

65. Drugs that increase production of cytochrome P-450 may decrease the effectiveness of combination oral contraceptives (COCs) by which of the following mechanisms?
   a. Decrease in absorption in the gastrointestinal tract
   b. Decrease in enterohepatic recirculation
   c. Increase in first-pass metabolism in the liver
   d. Increase in protein binding at receptor sites

66. A 20-year-old female who has a BMI of 38 (obese) presents for her first DMPA injection. Concerns in administering DMPA to this woman include which of the following?
   a. She may need a larger dose than the usual 150 mg.
   b. She should return for repeat injections every two months.
   c. You should massage the injection site well to ensure absorption.
   d. You should choose a site that ensures deep IM injection.
67. Instructions for progestin-only oral contraceptive users should include which of the following?
   a. If you are more than three hours late taking a pill, use a backup method for 48 hours.
   b. If you miss taking two pills in the third week of the pack, throw away the pack and start a new one.
   c. If you miss pills in the fourth week of the pack, do not have to use a backup method.
   d. If you miss two pills in the first week of the pack, make them up and use a backup method for seven days.

68. Obtaining a Z-score on a bone mineral density test might be appropriate for evaluating:
   a. 40-year-old female with a nontraumatic hip fracture.
   b. 46-year-old female with a strong family history of osteoporosis.
   c. 60-year-old female who smokes cigarettes and has a low body weight.
   d. 70-year-old female with osteoporosis being treated with a bisphosphonate.

69. The structure in the breast that is responsible for milk production is the:
   a. areola.
   b. alveoli.
   c. lobule.
   d. lactiferous sinus.

70. The hormone that stimulates synthesis of milk is:
   a. aldosterone.
   b. estrogen.
   c. progesterone.
   d. prolactin.

71. Contraindications to the use of medication abortion with mifepristone and misoprostol include all of the following except:
   a. current use of an anticoagulant medication.
   b. greater than seven weeks' gestation.
   c. known or suspected ectopic pregnancy.
   d. use of long-term systemic corticosteroid therapy.

72. Which of the following contraceptive choices should not be recommended for the perimenopausal woman who is having irregular menses?
   a. Combination oral contraceptives
   b. Diaphragm
   c. Fertility awareness methods
   d. LNG intrauterine system

73. The term that best describes an individual's physical and/or romantic attractions to other people is:
   a. gender identity.
   b. sexual drive.
   c. sexual motivation.
   d. sexual orientation.

74. A 26-year-old female is planning to use basal body temperatures for contraception. Which of the following statements would indicate that she needs further instruction about this method?
   a. "I will take my temperature the same time each day before getting out of bed."
   b. "I know that I am about to ovulate when my temperature rises at least 0.4 degrees Fahrenheit."
   c. "I will need to use a special thermometer to take my basal body temperature."
   d. "A rise of 0.4 degrees Fahrenheit above my baseline for three days indicates it is safe to have sex."

75. A woman who has been using a copper-releasing intrauterine contraceptive (IUC) presents with a positive pregnancy test. After determining that the pregnancy is intrauterine and the IUC is in place, the woman should be informed that:
   a. removing the IUC may increase the chance of a spontaneous abortion.
   b. the baby is at risk for congenital defects related to copper exposure.
   c. the IUC should be removed promptly regardless of her plans for the pregnancy.
   d. there is no risk to the baby if she leaves the IUC in place until delivery.

76. Instructions and/or information for a new user of combination oral contraceptives should include:
   a. combination oral contraceptives may decrease the effectiveness of some antibiotics.
   b. discontinue your pills immediately if you miss a period.
   c. start the first pack of pills on the last day of your next period.
   d. Sunday starters should use a backup method for the first week of the first pack of pills.

77. The most commonly used method of determining bone density to establish a diagnosis of osteoporosis or the need for preventive treatment is:
   a. dual energy X-ray absorptiometry.
   b. quantitative computerized tomography.
   c. quantitative ultrasound.
   d. single X-ray absorptiometry.

78. Instructions for the use of nonoxynol-9 spermicide should include which of the following?
   a. Place spermicide close to the opening of the vagina for maximal effectiveness.
   b. Remove excess spermicide from vagina within six hours to reduce vaginal irritation.
   c. When used with a condom, spermicide will further decrease the risk of STIs.
   d. Frequent use of spermicide may cause vaginal changes, making you more susceptible to HIV infection.

79. According to CDC recommendations, which of the following is considered to be a category 4 condition for use of the indicated contraceptive method?
   a. Use of emergency contraceptive pills by a woman who has history of deep vein thrombosis.
   b. Insertion of an IUC in a woman with a history of PID.
   c. Use of combination oral contraception by a 40-year-old woman who has migraine headaches without aura.
   d. Use of progestin-only pills by a woman who has type 2 diabetes.

80. Which of the following statements concerning coitus interruptus is false?
   a. It has a lower perfect use failure rate than the cervical cap.
   b. It may result in a decreased risk for HIV transmission to the female partner.
   c. Men are typically not able to predict the timing of ejaculation.
   d. There is a decreased chance for the presence of pre-ejaculatory sperm with repeat acts of intercourse.
1. d. Stabilizes the endometrium for less unscheduled bleeding. 
The estrogen in combination oral contraceptives stabilizes the endometrium for less unscheduled bleeding. Estrogen contributes to the inhibition of ovulation through suppression of FSH; however, it mainly potentiates the action of progestin, which has the most contraceptive effect.

2. b. Clinical breast examination
ACOG recommends annual clinical breast examination for women age 19 and older. Routine Pap testing for women ages 30 to 65 is recommended either every five years with HPV testing or every three years without HPV testing. Chlamydia testing in this age group is based on risk factors and symptoms of possible infection. ACOG recommends annual mammograms starting at age 40.

3. c. sterilization.
The most prevalent contraceptive method among married women in the United States is sterilization (female and male).

4. a. abstain from sex or use a barrier method for five days and then restart her COCs.
There is theoretical concern that hormonal contraception can reduce the effectiveness of ulipristal acetate (UPA) as emergency contraception. The woman should be advised not to start hormonal contraception for at least five days after taking UPA. She should also use a backup method for the first seven days after restarting her COCs.

5. d. PLISSIT model.
The clinician who is not a sex therapist can use the PLISSIT model to address sexual concerns and make appropriate referrals. The PLISSIT model includes permission giving, limited information, and specific suggestions provided by the clinician and referral for more intensive therapy if needed.

6. a. activin.
Activin is a polypeptide hormone produced by the ovaries that stimulates FSH production. Inhibin, also a polypeptide hormone, inhibits FSH production, and follistatin binds with activin to inactivate it, thus inhibiting FSH production.

7. c. Montgomery's glands.
Montgomery's glands are the sebaceous glands that circle the nipple within the area of the areola.

8. a. central nodes.
The pectoral, subcapsular, and lateral axillary lymph nodes drain into the central nodes that are located high in the axilla between the anterior and posterior axillary nodes and are the most likely to be palpable. The central nodes drain into the infracavicular and supraclavicular nodes.

9. a. healthy reproductive-age woman.
An acidic vagina pH (less than 4.5) is an expected finding in a healthy reproductive-age woman. This acidic pH is the result of the prevalence of Lactobacilli, which in turn is the result of the influence of estrogen initiated during puberty. Vaginal infections such as trichomoniasis and bacterial vaginosis may alter the pH, making it alkaline. Women with atrophic vaginitis also have a more alkaline pH as a result of decreased estrogen levels.

10. d. Lactobacilli.
Lactobacilli is the predominant vaginal organism responsible for an acidic pH in the reproductive-age woman.

11. d. transformation zone.
Squamous metaplasia is the process whereby columnar cells of the endocervix are replaced by mature squamous epithelium. The transformation zone is the area around the junction of squamous and columnar cells (squamocolumnar junction) where squamous metaplasia occurs.

12. c. There is thickened cervical mucus.
The luteal phase of the menstrual cycle begins after ovulation occurs, lasts approximately 14 days (± two days), and ends with the first day of menses. Progesterone secreted from the corpus luteum causes thickened cervical mucus. The luteal phase corresponds with the uterine secretory phase.

13. a. FSH.
Follicle-stimulating hormone (FSH) is released by the anterior pituitary gland in response to GnRH from the hypothalamus. FSH stimulates ovarian follicular growth, resulting in increased levels of the estradiol.

14. c. estrone.
The predominant estrogen after menopause is estrone. Estrone is converted from androstenedione produced by the adrenal gland and ovarian stroma.

15. d. Testosterone
Testosterone is produced in the adrenal gland, ovarian stroma, and through conversion of androstenedione and DHA in peripheral tissues. Testosterone is aromatized to estradiol in peripheral tissues.

16. a. Follicular
The follicular phase begins day 1 of menses and ends with ovulation. This phase is variable in time frame more so than the luteal phase, which is normally 14 days (± two days).

17. a. Estrogen
Estrogen is the predominant hormone during the uterine proliferative phase of the menstrual cycle, which correlates with the ovarian follicular phase. Under the influence of estrogen, the endometrium grows/thickens in the proliferative phase.

18. d. refer her for genetic counseling and possible genetic testing.
A family history of male breast cancer is a risk factor for hereditary breast cancer. Women with risk factors for hereditary breast cancer should be referred for genetic counseling and possible genetic testing.

19. b. Anorexia nervosa
The premenopausal woman with anorexia nervosa may have both a low FSH and low estradiol level.

20. d. It stimulates synthesis of milk proteins in mammary glands.
Prolactin is secreted by the anterior pituitary gland. During pregnancy, prolactin stimulates synthesis of milk proteins in mammary glands. Oxytocin is secreted by the posterior pituitary gland in response to suckling and stimulates the breast milk ejection reflex.

21. c. order an HIV-1 p24 antigen test.
The HIV-1 p24 antigen test detects HIV-1 antigen as early as two to six weeks after infection and declines once HIV antibodies develop. HIV antibodies are detectable in 95% of individuals within six months of infection. A combined HIV antibody and p24 antigen test is available.
22. b. pseudohyphae.
The addition of potassium hydroxide (KOH) to the vaginal wet-mount slide facilitates visualization of Candida pseudohyphae and buds.

23. a. qualitative sensitive urine hCG test.
Sensitive urine hCG tests may detect pregnancy as early as 28 days from the last menstrual period. Cross-reactions with other hormones are not a problem. A qualitative (positive/negative) test is the appropriate pregnancy test choice.

24. b. 45
The American Cancer Society recommends yearly mammograms for women starting at age 45.

25. d. was treated adequately for her syphilis and has not become reinfected.
Nontreponemal tests (VDRL, RPR) usually become nonreactive with time after treatment. Treponemal tests (FTA-ABS, TPI) usually remain positive indefinitely after treatment.

26. d. elasticity.
Spinnbarkeit refers to the elasticity of cervical mucus (ability to be stretched between two fingers) seen at ovulation and under the influence of estrogen.

27. b. combination oral contraceptives may potentiate the action of her bronchodilator.
Combination oral contraceptives may potentiate the action of some drugs, including benzodiazepines, tricyclic antidepressants, and theophylline.

28. d. Progestin-only contraceptive injections
Some anticonvulsant medications, including phenytoin, induce cytochrome P-450 enzyme activity and can cause increased first-pass metabolism of combination oral contraceptives as well as progestin-only pills. Although there is no first-pass metabolism with the transdermal contraceptive patch, the FDA applies the same warning about possible reduced efficacy. Depo medroxyprogesterone acetate injection effectiveness is not affected by anticonvulsant medications and may decrease the incidence of seizures in affected individuals.

29. d. She can use emergency contraception pills even if she has had other unprotected sex since her last period.
Emergency contraception pills should be taken as soon as possible after unprotected sex and within 120 hours for maximum effectiveness. If the woman has had previous unprotected sex since her last period and more than 120 hours ago, obtain a urine pregnancy test to rule out an existing pregnancy.

30. b. has dysmenorrhea.
The levonorgestrel-releasing IUC may cause reduced menstrual bleeding or amenorrhea and reduce dysmenorrhea. The copper-releasing IUC may increase dysmenorrhea.

31. c. keeping the IUC and repeating the Pap test in three years
Actinomycosis is a normal female genital tract organism. IUC users are more likely to have colonization. Pelvic infection from Actinomyces is a very rare, although it is a serious infection if it occurs. The Pap test does not diagnose actinomycosis infection. The asymptomatic IUC user should be informed of the Pap test result and should be advised that the IUC does not need to be removed nor does she need any antibiotic treatment unless infection occurs.

32. c. Flat spring
The flat spring diaphragm has gentle spring strength and is good for a woman with very firm vaginal tone.

33. a. diffuse sunburnlike rash.
The risk of toxic shock is only two to three in 100,000 women per year, but theoretically it may be increased in women who use the diaphragm or sponge. Symptoms of toxic shock include high fever, nausea/vomiting/diarrhea, syncope, joint/muscle aches, and a diffuse rash resembling sunburn.

34. c. It can remain in place for 48 hours.
The diaphragm should not be left in place for more than 24 hours. The cervical cap may be left in place for up to 48 hours.

35. d. The patient needs to return for a hystosalpingogram three months after the procedure.
The transcervical occlusion method of female sterilization (Essure) does not become effective immediately. The patient should use another method of contraception for three months after the procedure and then return for a hystosalpingogram to confirm correct placement of the micro inserts and total tubal occlusion.

36. d. stimulating uterine contractions.
Misoprostol is commonly used in conjunction with mifepristone or methotrexate for medical abortions. Misoprostol is a prostaglandin analog. It softens the cervix and stimulates uterine contractions.

37. c. They may cause irregular bleeding and spotting.
Users of progestin-only implants may cause irregular, prolonged, and more frequent bleeding, especially in the first few months. Progestin-only implants do not cause any decrease in bone mineral density. Most users ovulate within six weeks after removal.

38. a. nucleic acid amplification test (NAAT).
The CDC-recommended test for Chlamydia is NAAT. NAAT provides the option of testing with urine, vaginal (provider or patient obtained), or endocervical sample.

39. b. Estriol
Estriol is the least potent of the estrogens. It is derived from conversion of estrone and estradiol in the liver, uterus, placenta, and fetal adrenal gland.

40. d. prostaglandin
Prostaglandins act at target sites near areas of secretion. They regulate contraction and relaxation of smooth muscle. Prostaglandins are produced by the endometrium, with peak levels in the late secretory phase. They stimulate uterine myometrial contractions.

41. a. Chlamydia test.
The 18-year-old female with one sexually transmitted infection is at risk for other sexually transmitted infections such as Chlamydia. Pap tests and HPV testing are not appropriate for this patient. Indications for a type-specific herpes serologic test would pertain to history of known exposure at least four weeks ago or previous herpes-type lesions with a negative culture.

42. a. remove the IUC, place a new IUC at the current visit, and start her on doxycycline for five to seven days.
A partially expelled IUC should be removed. If the woman wants another IUC, it can be placed that same day after ruling out pregnancy. Doxycycline can be prescribed for five to seven days to reduce the risk of infection.

43. d. keep the current patch on if it adheres well and keep the same patch-change day.
If a contraceptive patch is detached for less than 24 hours, it can be reattached if it adheres well or a new patch can be applied. The woman should keep the same patch-change day. As long as it has been less than 48 hours since the patch detached, she does not need to use emergency contraception or a backup method.
44. d. progestin-only contraceptive injections.
Return to fertility after discontinuing progestin-only injections (DMPA) may take six to 12 months.

45. a. 9; 19
The woman who is going to use the calendar method for contraception should chart her menstrual cycles for several months. She should subtract 11 days from her longest recorded cycle and 18 days from her shortest cycle to estimate when she would be fertile and infertile. The woman with 27- to 30-day cycles should abstain from sexual intercourse from day 9 (27 minus 18) through day 19 (30 minus 11).

46. a. “I should insert a new ring every seven days.”
The contraceptive vaginal ring is worn in the vagina for three weeks, followed by one week without the ring, when the woman will have a withdrawal bleed. The exact position of the ring in the vagina is not important to effectiveness. The male condom can be used with the contraceptive vaginal ring.

47. c. Unexplained vaginal bleeding prior to evaluation
Unexplained vaginal bleeding prior to evaluation is a CDC category 3 for initiation of DMPA. Current and/or history of deep vein thrombosis or pulmonary emboli is category 2; drugs that alter liver enzymes do not influence effectiveness of DMPA, and smoking at any age is category 1 for use of DMPA.

48. d. Another method of contraception should be considered when the infant starts sleeping through the night.
Alternative contraception should be considered when any of the following occur—menstrual cycles, regular supplementation, long periods without breastfeeding, baby is six months old.

49. d. progestin-only pills.
Progestin-only methods are CDC category 1 for lactating women 30 or more days postpartum. Combination hormonal contraceptives are CDC category 3 for the first 42 days postpartum for women with other venous thromboembolism risk factors, which include obesity. Fertility awareness methods are not recommended until the woman has resumed regular menses. She is weaning her baby, so she will not be able to rely on the lactational amenorrhea method for contraception.

50. b. 2:00 p.m. on Saturday
The diaphragm should be left in place for at least six hours after sexual intercourse and no longer than 24 hours.

51. a. hepatitis B surface antigen.
Hepatitis B surface antigen is present with both acute active infection and with a chronic active (carrier) state.

52. b. perineum.
The area located between the fourchette anteriorly and the anus posteriorly is the perineum.

53. c. bone loss that is at the level for diagnosis of osteopenia.
Osteopenia is defined as a bone mineral density (BMD) between 1 and 2 standard deviations (SD) below that of a young normal adult. This is a T-score between –1 and –2.5.

54. d. She can have a blood test in one to two months to determine whether she has herpes antibodies. Type-specific serologic tests detect HSV-1 and HSV-2 antibodies. It may take four to 12 weeks for seroconversion.

55. c. vestibule.
The vestibule is enclosed by the labia minora. This area contains the urethral and vaginal openings; hymen; Skene's glands on each side of the urethral meatus; and Bartholin's glands, with openings located posteriorly on either side of the vaginal orifice.

56. a. normal uterus, normal ovaries.
In a reproductive-age woman, the uterus is approximately 8 cm in length, 5 cm in width, and 2.5 cm in thickness, with slightly larger dimensions in the multiparous woman than the nulliparous woman. Ovaries are approximately 3 cm × 2 cm × 1 cm.

57. a. Beginning breast development
Breast development begins with breast budding around age 9; the growth of pubic and axillary hair usually starts after breast development begins; and the peak growth spurt occurs around age 12, just prior to onset of menses.

58. b. Hypothalamus
Gonadotropin-releasing hormone (GnRH) is released from the hypothalamus in a pulsatile fashion. GnRH stimulates the anterior pituitary gland to release FSH and LH.

59. a. LH surge, ovulation, rise in BBT, thickened cervical mucus
The LH surge occurs in the follicular phase and peaks about 10 to 12 hours before ovulation occurs. There is an increase in basal body temperature (BBT) at the time of ovulation. After ovulation, the corpus luteum formed from the ruptured follicle secretes progesterone, which causes thickening of cervical mucus and a sustained increase in BBT.

60. d. Vaginal contraceptive ring for woman older than 35 years of age who smokes one pack of cigarettes per day
Smoking 15 or more cigarettes a day at age 35 years or older is a CDC category 4 for all of the combination hormonal contraceptives.

61. c. may be used by individuals with latex allergy.
The female vaginal condom is made of nitrile and previously polyurethane, so it may be used by individuals with latex allergy.

62. b. decrease in risk for cervical cancer.
Noncontraceptive benefits of combination oral contraceptives include decrease in benign breast disease, endometrial cancer, and ovarian cancer.

63. c. Intrauterine contraceptive
The perfect use and typical use failure rates are the same or very close to the same for both the levonorgestrel-releasing and copper-releasing intrauterine contraceptives. These methods do not require the woman to remember to do something each day or to have to have supplies available and use them at the time of sexual intercourse.

64. d. Transdermal contraceptive system
The transdermal contraceptive patch may be less effective in women who weigh 90 kg (198 lbs) or more.

65. c. Increase in first-pass metabolism in the liver
Drugs that increase production of the liver enzyme cytochrome P-450 may cause more rapid clearance of combination oral contraceptives during first-pass metabolism in the liver.

66. d. You should choose a site that ensures deep IM injection.
The IM formulation of DMPA must be given as a deep injection in the deltoid or gluteal muscle. For obese women, the deltoid may be preferable.

67. a. If you are more than three hours late taking a pill, use a backup method for 48 hours.
The major mechanism of action of progestin-only pills is the thickening of cervical mucus. Progestin-only pills must be taken at the same time each day to maintain adequate progestin for this effect.
Progestin levels peak shortly after taking a pill and decline to nearly undetectable levels 24 hours later.

68. a. 40-year-old-female with a nontraumatic hip fracture.
   A Z-score may be used to compare bone density in a premenopausal woman to an age-, gender-, and ethnicity-matched reference population to evaluate for secondary causes of osteoporosis.

69. b. alveoli.
   Alveoli within the breast lobules are responsible for milk production.

70. d. prolactin.
   Prolactin is released from the anterior pituitary gland in increasing amounts during pregnancy. Prolactin stimulates synthesis of milk proteins in mammary tissue.

71. b. greater than seven weeks’ gestation.
   The FDA has approved the use of mifepristone and misoprostol for medication abortion for up to 70 days after a last menstrual period.

72. c. Fertility awareness methods
   The perimenopausal woman who is having irregular menses may have unpredictable ovulation, so she should not rely on fertility awareness methods for contraception.

73. d. sexual orientation.
   Sexual orientation is the general term used to describe individuals’ physical and/or romantic attractions to other people, with the most common labels being heterosexual, homosexual (gay or lesbian), and bisexual. Sexual identity refers to one’s self-label as heterosexual, homosexual, bisexual, or something else. Gender identity is the internal sense that one is female, male, or some variation of both.

74. b. “I know that I am about to ovulate when my temperature rises at least 0.4 degrees Fahrenheit.”
   The rise in basal body temperature (BBT) occurs at the time of ovulation. BBT cannot be used to predict ovulation, but it can be used to determine whether ovulation has occurred.

75. c. the IUC should be removed promptly regardless of her plans for the pregnancy.
   Removing the IUC reduces the risk for spontaneous abortion.
   There is no risk of congenital defects from copper exposure. If the IUC is left in place, she is at risk for spontaneous septic abortion as well as preterm delivery.

76. d. Sunday starters should use a backup method for the first week of the first pack of pills.
   First day of menses start does not require backup contraception. Quick start of combination oral contraceptives requires backup contraception for seven days except if switching directly from one hormonal method to another. Sunday start requires seven days of backup method unless it corresponds with the first day of menses.

77. a. dual energy X-ray absorptiometry.
   Dual energy X-ray absorptiometry is the most-used technique for bone density testing and has low radiation exposure.

78. d. Frequent use of spermicide may cause vaginal changes, making you more susceptible to HIV infection.
   Frequent spermicide use (two or more times a day) may cause vulvovaginal epithelium disruption and a theoretical increase in susceptibility to HIV infection. Spermicide should be placed deep in the vagina close to the cervix and left there for at least six hours after sexual intercourse. When spermicide is used along with a condom, there is an increased contraceptive efficacy, but it will not further decrease the risk for STIs.

79. c. Use of combination oral contraception by a 40-year-old woman who has migraine headaches without aura
   The use of combination oral contraception by a woman who is 35 years or older and who has migraine headaches with or without aura is a CDC category 4. The use of combination oral contraception by a woman of any age who has migraine headaches with aura is also a CDC category 4.

80. d. There is a decreased chance for the presence of pre-ejaculatory sperm with repeat acts of intercourse.
   This statement is false. In itself, pre-ejaculatory fluid contains no sperm. However, with repeat acts of intercourse close together, subsequent pre-ejaculatory fluid may have “carryover” sperm from the previous ejaculation.

Bibliography


Menopause

• Demographics
  1. An estimated 6,000 U.S. women reach menopause every day; more than 2 million per year
  2. By 2020, the number of U.S. women older than 51 is expected to be more than 50 million
  3. With life expectancy of U.S. women estimated at 81.2 years, women can expect to live about one-third of their lives beyond menopause

• Definitions
  1. Menopause—permanent cessation of ovulation and menses; average age in United States is 52 years; genetically predetermined; confirmed after 12 consecutive months without a period
  2. Menopause transition—span of time when menstrual cycle and endocrine changes begin to occur and ending with the final menstrual period (FMP)
  3. Perimenopause—extends from beginning of menopause transition until 12 months after FMP
  4. Postmenopause—refers to the years following menopause
  5. Premature menopause—cessation of ovulation and menses before age 40; spontaneous or induced
  6. STRAW reproductive-aging continuum (North American Menopause Society, 2014)
    a. Standardized definition of reproductive aging based on specific clinical criteria, endocrine parameters, and characteristic markers
    b. Menstrual cycle changes are considered the principal clinical criteria
    c. Characteristic markers include vasomotor symptoms and symptoms of urogenital atrophy
    d. Endocrine parameters, including follicle-stimulating hormone (FSH), are considered as supportive criteria not typically measured for purposes of staging reproductive aging or menopause

(1) Anti-müllerian hormone (AMH)—produced exclusively by granulosa cells of preantral /small ovarian follicles; inhibits FSH-dependent follicular growth; may play a role in follicle recruitment and selection; marker of ovarian reserve; AMH begins to decrease as early as a woman’s late twenties and thirties; undetectable about five years after menopause

(2) Inhibin B—major ovarian peptide; rises and falls in first half of follicular phase, peaks midcycle, falls to lowest level in luteal phase; forms negative feedback loop to fine-tune pituitary FSH regulation; as number of ovarian follicles declines, inhibin B levels fall and FSH levels rise

(3) Antral follicle count—determined by ultrasound evaluation of ovary used primarily as factor in fertility counseling

(4) STAW reproductive-aging continuum (North American Menopause Society, 2014)

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(4) STAW reproductive-aging continuum (North American Menopause Society, 2014)
• Physiology
  1. Reproductive aging results in changes in the hypothalamic-pituitary-ovarian (HPO) axis
  2. Ovarian aging with follicular atresia is predominant event leading to menopause
  3. With decrease in number of responsive follicles, there is a decrease in production of estradiol
  4. Decrease in estradiol as well as decrease in inhibin B, an ovarian peptide, result in rise in FSH through negative feedback system
  5. During menopause transition, there is variability of hormone secretion and inconsistent ovulation—one reason that measuring estradiol and/or FSH levels is not reliable to determine menopause
  6. Elevated estradiol levels may occur in some cycles during menopause transition because of a luteal out-of-phase (LOOP) event—elevated FSH level adequate to recruit a second follicle in luteal phase of a cycle, resulting in a follicular-like rise in estradiol secretion
  7. Elevated estradiol levels may also occur with conversion of androgen to estrogen through aromatization, which also increases with age and body weight
  8. Menstrual cycle length typically begins to vary in the early menopause transition and then, as one moves into late menopause transition, there are episodes of amenorrhea of 60 consecutive days or more; individual women may have different patterns
  9. The hallmark for the end of the menopause transition and initiation of the postmenopause is the FMP
  10. Elevated FSH and luteinizing hormone (LH) levels and low estradiol levels stabilize after the first one to two years postmenopause
  11. After menopause, estrone becomes the predominant circulating estrogen
  12. Estrone is derived primarily through peripheral conversion in adipose tissue (i.e., aromatization) of androstenedione, an androgen produced by adrenal cortex and ovarian stroma
  13. Generally rely on cessation of menses, hypoestrogenic symptoms, and age for diagnosis of menopause

• Laboratory findings
  1. FSH—greater than 40 mIU/mL
  2. LH—threefold elevation after menopause (20–100 mIU/mL)
  3. Estradiol—less than 20 pg/mL

• Physical changes
  1. Some related to hormonal changes; some related to normal changes with aging; some related to combination of both
  2. Body weight and fat distribution
    a. No data to support that menopause hormonal changes are responsible for weight gain; more likely the result of aging and lifestyle
    b. Some evidence that changes in body composition and fat distribution may be related to menopause; change in fat distribution from subcutaneous stores to visceral abdominal fat
  3. Skin
    a. Skin has a significant number of estrogen receptors
    b. Declines in skin collagen and skin thickness correlate with years since menopause
    c. Scalp, pubic, and axillary hair becomes thinner and drier
  4. Bone integrity—increased bone loss associated with decrease in estrogen; greatest loss in first few years after menopause then slows but continues
  5. External and internal genitalia
    a. Labia—decrease in subcutaneous fat and tissue elasticity
    b. Vagina
      1. Decrease in estrogen and concomitant change in vaginal microbes increases vaginal pH from acidic to alkaline environment; pH ≥ 5.0
      2. Decrease in estrogen results in vaginal epithelium with higher proportion of parabasal cells than mature superficial cells
        a. Epithelium becomes thinner, less vascular, and less elastic
        b. Vaginal walls appear thin, smooth, and pale
        c. Vaginal walls may have small petechiae and be friable to touch
    c. Cervix—decrease in size; os may become flush with vaginal walls; may become stenotic
    d. Uterus and ovaries—decrease in size; ovaries usually not palpable
  6. Urinary tract
    a. Urethra and trigone of the bladder have high concentration of estrogen receptors; as with the vulva and vagina, decreased estrogen may result in atrophic changes
    b. Urethral meatus may become more prominent as labia minora thin and introitus retracts

• Mood changes and cognitive function
  1. Majority of women do not have psychological problems attributable to menopause
  2. Women with history of previous clinical depression, premenstrual syndrome, or postpartum depression may be more vulnerable to recurrent depression during perimenopause
  3. Perimenopausal depression may be an interplay between hormonal fluctuations, stressful events, lifestyle factors, psychosocial support
  4. About one-fourth of women do report some mood changes during menopause transition
  5. Individual characteristics and self-perception appear to be important determinants of each woman’s experience of the perimenopause
  6. No evidence that memory or cognitive skills decline directly as a result of normal menopause transition
  7. Ability to concentrate may be reduced by sleep disturbances and fatigue related to hot flashes
  8. Women’s Health Initiative Memory Study (WHIMS)—risk of dementia increased in healthy women aged 65 to 79 years using estrogen with progesterone therapy
  9. Unclear how estrogen or estrogen with progesterone therapy affects cognitive function in younger menopausal women

• Cardiovascular system effects
  1. Increase in LDL-C, VLDL-C, triglycerides; possible decrease in HDL-C
  2. Increase in certain fibrinolytic and procoagulation factors that regulate clotting processes
3. Increase in endothelin and decrease in angiotensin-converting enzyme (vasoconstrictors); increase in nitric oxide and decrease in prostacyclin (vasodilators)

4. Extent of impact of decreased estrogen levels on cardiovascular disease not definitively established

**Well-Woman Visit Ages 40 to 64**

- Comprehensive health history
  1. Identify disease risk factors, health-promoting behaviors, symptoms of disease, current status of diagnosed conditions, medications used
  2. Identify psychological and social concerns—emotional, physical, sexual abuse by family or partner, current or past; drug/alcohol use; depression
  3. Discuss sexuality/sexual history—sexual orientation, gender identity, sexual practices, sexual satisfaction, dyspareunia, use of contraception if needed; use of condoms
  4. Ask about menopausal symptoms, symptoms of pelvic prolapse, urinary and fecal incontinence
  5. Learn what is most important to the individual woman as it relates to her health and quality of life as she moves through perimenopause and beyond

- Physical examination
  1. Height—yearly; height loss greater than 1.5 inches (3.8 cm) may be associated with vertebral compression fractures and thus osteoporosis
  2. Weight/body mass index (BMI)—yearly
  3. Blood pressure—yearly
  4. Clinical breast examination (CBE)
    a. American College of Obstetricians and Gynecologists (ACOG)—yearly CBE
    b. American Cancer Society (ACS), United States Preventive Services Task Force (USPSTF)—CBE not recommended for women at average risk for breast cancer
  5. Pelvic examination—if need pap test or otherwise indicated; performing routine pelvic exam (external genitalia, speculum, bimanual) should be a shared, informed decision between patient and healthcare provider
  6. Other as indicated by history and/or risk factors

- Screening tests
  1. Cervical cancer screening (ACS, ACOG, USPSTF)—cytology with HPV test every five years or cytology alone every three years
  2. Colorectal cancer screening
    a. ACS—beginning at age 50 colonoscopy every 10 years, flexible sigmoidoscopy every five years, double-contrast barium enema every five years, or computed tomography (CT) colonography (virtual colonoscopy) every five years
    b. ACOG—colonoscopy every 10 years for average-risk women beginning at age 50 years and at age 45 years for African American women
    c. USPSTF—begin colorectal cancer screening at age 50; no head-to-head studies demonstrating any of the various screening strategies are more effective than the others (Grade A Strong Recommendation)
  3. Breast cancer screening—mammography
    a. ACS—yearly beginning at age 45 years for women at average risk; women age 55 and older can transition to biennial screening or continue annual screening if they prefer
    b. ACOG—yearly starting at age 40 years
    c. USPSTF—biennial screening from age 50 to 74 years (Grade B Recommendation)

- Immunizations
  1. Influenza annually
  2. Herpes zoster (shingles)—one-time dose for all individuals 60 years of age or older, regardless of previous history of shingles
  3. Tetanus, diphtheria, and acellular pertussis (Td/Tdap)
    a. Recommended three-dose vaccination series including Tdap dose for adults with unknown or incomplete history of primary Td vaccination
    b. Recommended one dose of Tdap for adults who have not previously received Tdap
    c. Booster Td vaccination every 10 years for adults

- Counseling/education
  1. Lifestyle modifications to reduce disease risk factors/promote health—nutrition, physical activity, safer sex practices, smoking cessation, avoiding abuse of alcohol and other substances; stress management
  2. Contraception if needed—see Chapter 4 of this text for information about contraception for women older than 40 years; hormonal contraception may alleviate some menopause transition symptoms
  3. Breast self-awareness
  4. Recommended screening tests schedule
  5. Expected hormonal and menstrual changes during perimenopause
  6. Management of perimenopause symptoms
  7. Other as indicated by health history/physical examination findings/risk factors
Vasomotor Symptoms (VMS)

- Definition—recurrent, transient episodes of flushing accompanied by sensation of warmth to intense heat on upper body and face
  1. May include profuse sweating and palpitations
  2. May awaken during night, leading to insomnia, sleep disturbance, cognitive (memory) and affective (anxiety) disruptions with loss of REM sleep

- Demographics/prevalence
  1. About 75% of U.S. women experience hot flashes during perimenopause
  2. Usually begins in late menopause transition, with highest frequency and severity within first two years after FMP
  3. Most women experience hot flashes for six months to two years, but some may experience for 10 or more years
  4. Induced menopause (surgical, chemotherapy) may result in more frequent and severe hot flashes
  5. Greater proportion of women who are overweight or obese report hot flashes compared with women of normal weight

- Etiology—specific mechanism unknown; gonadotropin-related effect on the central thermoregulatory function of the hypothalamus (measurable increase in core body temperature, increase in body surface temperature, peripheral vasodilation, then decrease in core temperature)

- Management—nonpharmacologic
  1. Lifestyle changes may be helpful, especially for mild VMS
  2. Maintain a healthy body weight—in women who are obese, weight loss has been associated in reduction in hot flash frequency
  3. Refrain from smoking—current and past cigarette smoking increases relative risk of hot flashes; may be related to effect on estrogen metabolism
  4. Exercise regularly—some data to support regular, moderate exercise is associated with decreased incidence of hot flashes
  5. Keep core body temperature as cool as possible—sleep in cool room, keep insulated bottle of ice water available, wear layers and natural fibers
  6. Practice relaxation techniques—anxiety associated with increased severity and frequency of hot flashes
  7. Soy foods/isoflavone supplements—data from meta-analysis of 17 small randomized controlled trials (Taku, Melby, Kronenberg, Kurzer, & Messina, 2012) support efficacy to reduce hot flash frequency and severity; soy products vary in composition and concentration
  8. Black cohosh—conflicting data regarding beneficial effect on hot flash frequency and severity; multiple products and formulations available; rare side effects of intestinal upset, headache, dizziness with larger doses; safety for use beyond six months not yet established
  9. No data to support caffeine, alcohol, spicy foods, big meals as triggers of hot flashes

- Management—Pharmacologic (Hormonal Therapy [HT])
  1. Terminology
    a. Estrogen therapy (ET)—unopposed estrogen prescribed for women who have had a hysterectomy

b. Estrogen-progesterone therapy (EPT)—combination of estrogen and progestogen (either progesterone or progestin, a synthetic form of progesterone); progestogen main purpose is to reduce risk of endometrial cancer in women with a uterus associated with unopposed estrogen
c. Estrogen types
  1. 17β-estradiol—only human estrogen available in FDA-approved, single-progestogen product
  2. Conjugated estrogen (CE)—mixture of estrogens obtained from natural sources (i.e., urine of pregnant mares)
  3. Synthetic estrogen—esterified estrogen, synthetic conjugated estrogen, ethinyl estradiol, estramustine
d. Progestogen types
  1. Progesterone—compound identical to endogenous steroid hormone produced by ovaries, or micronized progesterone
  2. Progestin—synthetic product that has progesterone-like activity but is not identical to endogenous progesterone (medroxyprogesterone acetate [MPA], norethindrone, norethindrone acetate, drospirenone, levonorgestrel)
e. Selective estrogen-receptor modulators (SERMs), also known as estrogen receptor agonists/antagonists (ERAAs)—estrogen-like compounds that act as estrogen agonists or antagonists depending on the SERM and target tissue
  1. Bazedoxifene (BZA) is a SERM with estrogen antagonist effects on endometrial and breast tissue and estrogen agonist effects on bone
  2. BZA combined with CE (BZA/CE) provides an alternative to adding a progestogen to prevent endometrial hyperplasia
  3. Study data indicate less unscheduled uterine bleeding and less breast tenderness than seen with CE combined with MPA (CE/MPA) and similar prevention of bone loss, vasomotor symptoms, and vulvovaginal atrophy compared with CE/MPA

f. Bioidentical hormones
  1. Hormones chemically identical to hormones produced by women during their reproductive years (17β-estradiol, estrone, estradiol, progesterone, testosterone)
  2. Bioidentical hormone therapy (BHT) provides one or more of these hormones as active ingredients
  3. 17β-estradiol is available in several FDA-approved ET products in oral, transdermal, and vaginal preparations
  4. Progesterone is available in an FDA-approved oral capsule and vaginal gels
  5. Custom-compounded BHT uses commercially available hormones with the type and amount prescribed by the clinician
  6. Custom-compounded BHT products are not FDA approved; there is no evidence that they are safer than conventional HT; the same contraindications apply to their use
  7. No evidence that saliva testing is effective for customizing hormone dosing regimen

2. Indications for HT
  a. Relief of moderate to severe VMS and/or vulvovaginal atrophy (VVA) not relieved by lifestyle changes
  b. Prevention of osteoporosis
  c. HT should not be used to prevent coronary heart disease, stroke, or dementia
3. Contraindications
   a. Active or history of deep vein thrombosis or pulmonary embolism
   b. Active or history of arterial thromboembolic disease (e.g., stroke, myocardial infarction)
   c. Known, suspected, or history of breast cancer
   d. Known or suspected estrogen-dependent cancer
   e. Liver dysfunction or disease
   f. Undiagnosed abnormal uterine bleeding
   g. Known or suspected pregnancy
   h. Low-dose vaginal ET with only local (no systemic) effects may be considered with above contraindications

4. Potential risks
   a. Endometrial hyperplasia/cancer—estrogen alone
   b. Breast cancer
      (1) Relationship with HT inclusive
      (2) Possible small but significant increase of breast cancer with long-term use
   c. Thromboembolic disorders—coronary heart disease, stroke, VTE
      (1) Relationship with HT inconclusive
      (2) Women who start HT at or close to menopause do not incur the same risks as those who start several years after menopause
      (3) Oral ET affects cardiovascular markers—positive effects are increase in HDL-C and decrease in LDL-C levels; negative effects are increase in triglycerides and C-reactive protein levels
      (4) Transdermal ET has no effect on cardiovascular markers
      (5) VTE risk is lower with transdermal ET than with oral ET
      (6) No HT regimen should be used for primary or secondary prevention of cardiovascular disease or stroke
      (7) HT should be avoided in women with elevated risk for stroke

5. Assessment and education prior to initiation of HT
   a. Health history with attention to specific contraindications and precautions
   b. General physical examination, cervical cancer screening per recommended schedule
   c. Clinical breast examination and screening mammogram per recommended schedule
   d. Informed and shared decision making concerning HT use based on woman's symptoms, treatment goals, risk-benefit analysis
   e. Provide anticipatory guidance on possible need to adjust type and amount of HT for symptom relief or to alleviate possible side effects (e.g., breast tenderness, headaches, bloating, mood changes); expected bleeding patterns and what to report

6. Routine follow-up after HT initiation
   a. Evaluate continuing need for HT at annual well-woman visits and discontinue as appropriate
   b. No data available regarding choice of abrupt cessation versus tapering to avoid resumption of menopausal symptoms
   c. Approximately 50% experience recurrence of symptoms with discontinuation regardless of age or length of time HT was used
   d. Decision to continue HT should be individualized based on severity of symptoms and risk-benefit ratio

   e. Consider low-dose vaginal ET for symptoms of vulvovaginal atrophy not relieved by nonhormonal therapies
   f. Consider nonhormonal therapies for osteoporosis if long-term therapy needed

7. Routes of administration
   a. Oral
      (1) ET, EPT, CE/BZA
      (2) First-pass metabolism determines bioavailability
      (3) Increased HDL-C and decreased LDL-C
      (4) Increased triglycerides, C-reactive protein
   b. Transdermal /topical
      (1) Systemic absorption
      (2) Patch—estrogen and progestogen combined or estrogen only
      (3) Topical sprays, gels, and emulsions—17β-estradiol
      (4) May use lower doses as not dependent on GI absorption and no first-pass hepatic metabolism
      (5) No significant impact on HDL-C, LDL-C, triglycerides, C-reactive protein
      (6) May have less adverse effects on gallbladder and coagulation factors than oral estrogen
      (7) Need added progestogen with intact uterus
      (8) Topical progesterone preparations may not provide sufficient endometrial protection
   c. Estrogen vaginal ring (Femring)
      (1) Systemic absorption
      (2) Approved for treatment of VMS and vulvovaginal atrophy
      (3) Ninety-day duration
      (4) Need added progestogen if have intact uterus
   d. Estrogen vaginal ring (Estring)
      (1) Low dose with little or no systemic absorption
      (2) Used for treatment of vulvovaginal atrophy
      (3) Will not provide relief from VMS
      (4) Ninety-day duration
      (5) Progestogen does not need to be added with low-dose vaginal ring
   e. Vaginal estrogen creams and tablets
      (1) Used for treatment of vulvovaginal atrophy
      (2) Little or no systemic absorption
      (3) Will not provide relief from VMS
      (4) Progestogen does not need to be added with low-dose vaginal estrogens
   f. Progestogens
      (1) Oral—medroxyprogesterone acetate (MPA), norethindrone, norethindrone acetate, drospirenone, micronized progesterone
      (2) Transdermal in EPT patches—norethindrone acetate, levonorgestrel
      (3) Intrauterine—levonorgestrel intrauterine system (LNG-IUS)
      (4) Vaginal—progesterone gel, micronized progesterone insert

8. Regimen options
   a. Recommendations for progestogen use for endometrial protection with standard estrogen dosing
      (1) Twelve to fourteen days each month of 5 mg of medroxyprogesterone acetate (MPA) or equivalent
Management—pharmacologic (nonhormonal)

1. Selective serotonin reuptake inhibitor (SSRI)—paroxetine 7.5 mg taken once daily at bedtime is only nonhormonal prescription medication approved by FDA for treatment of VMS
2. Other SSRIs and serotonin norepinephrine reuptake inhibitors (SNRIs) have demonstrated positive results in treatment of hot flashes
3. Gabapentin, an anticonvulsant medication, has been shown to be effective in reduction of severity and frequency of hot flashes

Genitourinary Syndrome of Menopause (GSM)

1. Definition—collection of symptoms and physical findings associated with decreased estrogen and other sex steroids involving changes to the labia majora/minora, vestibule/introitus, clitoris, vagina, urethra and bladder (North American Menopause Society, 2014); symptoms include but are not limited to:
   a. Genital dryness, burning, irritation
   b. Sexual symptoms of lack of lubrication, discomfort or pain, impaired function
   c. Urinary symptoms of frequency, nocturia, urgency, dysuria, and recurrent urinary tract infections
2. Demographics—affects up to 50% of midlife and older women
3. Etiology
   a. Signs and symptoms associated with GSM are related to reduced circulating estrogen and aging
   b. High concentration of estrogen receptors in vagina, vestibule, urethra, and bladder trigone modulate cell proliferation and maturation
   c. Low circulating levels of estrogen result in anatomic and physiologic changes in urogenital tissues
      (1) Reduced collagen, decreased elastin, epithelium thinning, and fewer blood vessels
      (2) Decreased vaginal blood flow, diminished lubrication, decreased elasticity and flexibility of vaginal vault, decreased vaginal tissue strength
      (3) Thinning and regression of labia minora, retraction of introitus, more prominent urethral meatus
      (4) Decreased vaginal lactobacilli and increased vaginal pH
4. Management/treatment
   a. Symptoms of GSM can have a negative effect on quality of life that may extend to activities of daily living, exercise, sexual function, interpersonal relationships
   b. Rule out other causes of symptoms
   c. Nonhormonal therapies
      (1) Vaginal lubricants—effects immediate; intended to reduce friction on atrophic vulvovaginal structures during sex; may be water-, silicone-, or oil-based
      (2) Vaginal moisturizers—applied several times weekly for longer-term relief of vaginal dryness; help to maintain vaginal moisture and lower vaginal pH
      (3) Regular sexual activity—promotes blood flow to genital area
      (4) Noncoital methods of sexual expression if penetration is painful—massage, oral stimulation, mutual masturbation
   d. Hormonal therapies
      (1) Low-dose vaginal estrogen—consider if nonhormonal therapies do not relieve symptoms or if have severe GSM symptoms

• Side effects of HT
  1. Breast tenderness—estrogen or progestogen (usually subsides after first few weeks)
  2. Nausea—estrogen (relieved if taken at mealtime or bedtime)
  3. Skin irritation with transdermal patches
  4. Fluid retention and bloating—estrogen or progestogen
  5. Alterations in mood—progestogen
• Management of side effects may include:
  1. Lowering dose
  2. Altering route of administration
  3. Changing to different formulation
• Management of bleeding during HT
  1. Continuous-cyclic regimen—usually experience some uterine bleeding; starts last few days of progestogen administration or during progestogen-free days; earlier bleeding, heavy or persistent bleeding may indicate endometrial hyperplasia and warrants endometrial evaluation
  2. Continuous-combined regimen—erratic spotting and light bleeding of one to five days duration in first year; need endometrial evaluation if bleeding heavier or longer than usual or if resumes after several months of amenorrhea
  3. Use of LNG-IUS for progestogen may result in less bleeding
  4. CE/BZA—data indicate less unscheduled uterine bleeding than CE/MPA
(2) Ospemifene—SERM approved in 2013 for treatment of moderate to severe dyspareunia related to vulvovaginal atrophy; daily oral dose
(a) Estrogen agonist effect on vaginal tissue to thicken and make less fragile; decrease in vaginal pH; may take several weeks for full relief of symptoms
(b) No FDA indication for bone health protection listed
(c) Weak estrogen agonist effect on uterus and breasts—FDA requires listing of same contraindications as those for use of estrogen
(d) Should not be used with estrogen or another SERM
(e) Use of progestogen with ospemifene has not been evaluated in clinical trials
(f) Most common side effects are hot flashes, vaginal discharge, muscle spasm, increased sweating
(3) Systemic ET/EPT—only if also using for relief of moderate to severe VMS

Older Adults

- Definitions
  1. Aging—process of becoming older; genetically determined and environmentally modulated
  2. Elderly—generally accepted in developed countries as referring to individuals 65 years of age and older
  3. Theories on aging—biologic, sociologic, developmental
- Demographics (Administration on Aging, 2014 data)
  1. Elderly individuals represent 14.1% of the U.S. population, about one in every seven Americans
  2. By year 2030, 25% of Americans will be older than 65 years
  3. U.S. women at age 65 have a 20.5 year's life expectancy (85.5 years)
  4. Most elderly individuals live in the community; about 4% reside in institutional facilities
  5. About 28% of noninstitutionalized elderly individuals live alone; women are four times more likely to be widowed than men and over twice as likely to be living alone
  6. About 9.5% of elderly individuals are below poverty level; poverty is more prevalent in elderly women than in elderly men
  7. Leading causes of death for U.S. women overall at age 65 and older in rank order are:
     a. Heart disease
     b. Cancer
     c. Chronic obstructive pulmonary disease
     d. Stroke
     e. Alzheimer's disease
     f. Diabetes
     g. Influenza/pneumonia
     h. Unintentional injuries
     i. Kidney disease
     j. Hypertension
- Anatomical and physiologic changes with aging/potential clinical implications (not all-inclusive)
  1. Extent and rate of changes and clinical implications vary with individual

  2. Skin
     a. Thinner, decreased elasticity, cell regeneration slower; sebaceous and sweat gland activity decreases; dry skin, pruritus, increased risk of skin infection, decreased wound healing
     b. Cutaneous sun exposure damage contributes to increase in skin changes—wrinkles; irregular pigmentation; solar lentigines (brown/age spots); telangiectasia; cherry angiomas; seborrheic keratosis; and actinic keratosis, which are premalignant sun-induced growths
  3. Eyes—decreased tear production, pupils smaller, lens stiffens; dry eyes, decreased near vision, decreased adaptation to darkness
  4. Ears—atrophy of auditory neurons; increased cerumen; sclerosis of tympanic membrane: sensorineural hearing loss (high frequency first), conductive hearing loss
  5. Mouth, nose, and teeth—decreased number of taste buds, atrophy of salivary glands, gingival tissue less elastic, softening of teeth, decrease in olfactory neurons: decreased appetite, dry mouth, loss of teeth, difficulty chewing
  6. Thorax and lungs—rib cage less mobile, decreased strength of expiratory muscles, alveoli less elastic; decreased ability to clear lungs with less efficient cough; decreased ventilation at lung bases; decreased reserve for response to exercise, stress, or disease
  7. Heart—left ventricular wall thickens, myocardium becomes less elastic, fibrosis and sclerosis of heart valves and within conduction system (SA node), stroke volume decreases, heart rate slows but resting heart rate not significantly influenced: cardiac output during exercise declines with less efficient response to increased oxygen demand and longer recovery time to baseline, irregular heart rhythms, mild ECG changes
  8. Peripheral vascular system—aorta and large arteries stiffen: rise in systolic blood pressure, tendency toward orthostatic hypotension
  9. Gastrointestinal (GI) system—decreased motility of intestines, decreased secretion of digestive enzymes and protective mucous in intestinal tract, decrease in liver size and hepatic blood flow: constipation, indigestion, decrease in ability to metabolize some drugs and alcohol, increased risk of stomach ulcers and GI bleeding with long-acting nonsteroidal anti-inflammatory drugs
  10. Musculoskeletal system—bone demineralization, decreased muscle mass and strength, decreased range of motion, joint and cartilage erosion: decreased bone density, decreased agility and endurance, gait disturbances, increased risk for falls
  11. Neurologic system—general decrease in brain volume and cerebral blood flow, decrease in velocity of nerve impulse conduction, diminished sensory perceptions of touch and pain stimuli, motor responses slow: slower reaction time, possible decreased response to pain, decrease in coordination and balance
  12. Genitourinary—vulvovaginal atrophy, ovarian atrophy, decreased bladder capacity and tone: dyspareunia; ovaries usually not palpable; urinary frequency, urgency, incontinence; pelvic prolapse

- Cognitive changes
  1. Definitions/characteristics (Institute of Medicine, 2015)
     a. Cognition is multidimensional, including mental functions involved in attention, thinking, understanding, learning, remembering, solving problems, and making decisions
     b. Cognitive aging is inherent in all humans as they age; highly dynamic process with variability within and between individuals
Well-Woman Visit Age 65 and Beyond

- Comprehensive health history
  1. Identify disease risk factors/health-promoting behaviors, symptoms of disease, current status of diagnosed conditions, medications used
  2. Identify psychological and social concerns—social support systems; isolation; emotional, physical, sexual, financial abuse or neglect by family or partner; drug/alcohol use; depression
  3. Discuss sexuality/sexual history—sexual orientation, gender identity, sexual practices, sexual satisfaction, dyspareunia, use of condoms
  4. Ask about menopausal symptoms, symptoms of pelvic prolapse, urinary and fecal incontinence
  5. Learn what is most important to the individual woman as it relates to her health and quality of life

- Physical examination
  1. Height—yearly; height loss greater than 1.5 inches (3.8 cm) may be associated with vertebral compression fractures (VCFs) and thus osteoporosis
  2. Weight/body mass index (BMI)—yearly
  3. Blood pressure—at each visit
  4. Clinical breast examination (CBE)—yearly
    a. American College of Obstetricians and Gynecologists (ACOG)—yearly CBE
    b. American Cancer Society (ACS), United States Preventive Service Task Force (USPSTF)—CBE not recommended for women at average risk for breast cancer
  5. Pelvic examination—if need pap test or otherwise indicated; performing routine pelvic exam (external genitalia, speculum, bimanual) should be a shared, informed decision between patient and healthcare provider

6. Other as indicated by history and/or risk factors

- Functional assessment
  1. Evaluation of individual’s ability to carry out basic tasks for self-care (activities of daily living [ADL]) and tasks needed to support independent living (instrumental activities of daily living [IADL])
    a. ADL—ability to eat, bathe, dress, groom, ambulate, toilet
    b. IADL—ability to use phone, get to appointments, shop, prepare meals, take medications, manage money
  2. Provides information for healthcare provider to:
    a. Identify specific areas in which help is needed/not needed
    b. Identify changes in abilities from one period of time to another
    c. Determine need for any special services
    d. Assess safety of a particular living situation
  3. Includes assessment of physical, cognitive, emotional, and social functions
  4. Affected by medical conditions, sensory deficits, resources, support system

- Screening tests
  1. Cervical cancer screening (ACS, ACOG, USPSTF)—age ≥ 65 years
    a. No screening following adequate negative prior screening; do not resume screening even if woman reports new sexual partner
    b. Women with history of CIN2 or a more serious diagnosis should continue routine screening for at least 20 years after spontaneous regression or treatment
    c. No screening after hysterectomy with cervix removed unless history of CIN2 or more severe diagnosis in past 20 years or cervical cancer ever
  2. Colorectal cancer screening
    a. ACS—beginning at age 50, colonoscopy every 10 years, flexible sigmoidoscopy every five years, double-contrast barium enema every five years, or computed tomography (CT) colonography (virtual colonoscopy) every five years
    b. ACOG—colonoscopy every 10 years for average-risk women beginning at age 50 years and at age 45 years for African American women
    c. USPSTF—begin colorectal cancer screening at age 50; no head-to-head studies demonstrating any of the various screening strategies are more effective than the others (Grade A Strong Recommendation)
  3. Breast cancer screening—mammography
    a. ACS—yearly, beginning at age 45 years for women at average risk; women age 55 and older can transition to biennial screening or continue annual screening if they prefer
    b. ACOG—yearly, starting at age 40 years
    c. USPSTF—biennial screening from age 50 to 74 years (Grade B recommendation)
    d. ACS and ACOG—no definitive age to discontinue mammogram screening; base on woman’s health and whether or not she would be candidate for treatment of breast cancer
  4. HIV screening if sexually active—yearly if high risk
  5. Hepatitis C—screen once if born between 1945 and 1965 and no other risk factors
  6. Diabetes screening—every three years starting age 45 (American Diabetes Association, 2016)
For most immunocompetent adults age 65 years and older, the improved osteoporosis risk factors for women include being 55 years of age or older, family history of premature CHD (male relative < 55 years, female relative < 65), cigarette smoking, hypertension, HDL at less than 40 mg/dL, diabetes mellitus.

No recommendation on interval of screening; USPSTF states every five years is reasonable.

Bone mineral density (BMD) — National Osteoporosis Foundation (2013)

- Screen all women 65 years of age or older for osteoporosis/osteopenia with BMD test
- No available specific recommendations on frequency of screening or when to discontinue
- Data from the NIH Osteoporotic Fractures Study (Gourlay et al., 2012) of women 65 years of age or older over 15 years indicated that:
  1. Less than 1% who initially had normal BMD (T-score ≥ −1.00) went on to develop osteoporosis (T-score ≤ −2.50) during the study
  2. Only 5% with mild osteopenia (T-score −1.01 to −1.49) went on to develop osteoporosis during the study
  3. 10% with moderate osteopenia (T-score −1.50 to −1.99) at baseline developed osteoporosis within five years
  4. 10% with advanced osteopenia (T-score −2.00 to 2.49) at baseline developed within a year
  5. Findings suggest that women with baseline normal BMD or mild osteopenia do not need frequent screening and could wait up to 15 years before rescreening
  6. Findings suggest that women with baseline moderate or advanced osteopenia need more frequent screening

- Immunizations
  1. Influenza annually
  2. Herpes zoster (shingles)—one-time dose for all individuals 60 years of age or older regardless of previous history of shingles
  3. Tetanus, diphtheria, and acellular pertussis (Td/Tdap)
     a. Recommended three-dose vaccination series including Tdap dose for adults with unknown or incomplete history of primary Td vaccination
     b. Recommended one dose of Tdap for adults who have not previously received Tdap
     c. Booster Td vaccination every 10 years for adults
  4. Pneumococcal vaccine
     a. One dose of 13-valent pneumococcal conjugate vaccine (PCV13) for all adults age 65 years and older who have not previously received it
     b. One dose of 23-valent pneumococcal polysaccharide vaccine (PPSV23) for all adults age 65 years and older regardless of previous history of vaccination with pneumococcal vaccines
     c. PCV13 and PPSV23 should not be administered at the same office visit
     d. When both are indicated, PCV13 should be given before PPSV23 whenever possible
     e. For most immunocompetent adults age 65 years and older, the two vaccines should be given at least one year apart
  5. Other as indicated by health history/risk factors

- Counseling/education
  1. Lifestyle modifications to reduce disease risk factors and promote health — nutrition, physical activity, safer sex practices, smoking cessation, avoiding alcohol or other substance abuse. stress management, fall prevention
  2. Breast self-awareness
  3. Recommended screening tests schedule
  4. Discussion about establishing advance directives, living wills, durable power of attorney for health care, palliative care
  5. Other as indicated by health history/physical examination findings/risk factors

Pharmacologic Considerations for Elderly Patients

1. Majority of the elderly have one or more chronic conditions and are taking multiple medications — prescription and over the counter (OTC)
2. Age-related decreases in metabolism and excretion of drugs may result in increased plasma concentrations
3. Increased risk for adverse drug reactions (ADRs) — drug — drug — food — drug — herb interactions, side effects, toxic effects
4. Common ADRs in elderly — dizziness, gastrointestinal symptoms, edema, urinary retention or incontinence, confusion
5. Other considerations that may lead to problems with use of medications — memory deficit, visual deficit, mobility problems, multiple providers and pharmacies, cost
6. Conduct comprehensive drug assessments — prescription medications, OTC medications, herbs, and dietary supplements
7. Be alert to medications as possible cause for untoward physiological or mental status changes
8. Start with low doses and increase slowly
   a. Lists medications best avoided in older adults in general or those with certain diseases or syndromes and medications that should be prescribed at reduced dosage or with careful monitoring to avoid adverse events
   b. Examples of drugs to avoid when possible with elderly patients because of increased risk for adverse events include:
      1. Long-acting nonsteroidal anti-inflammatory drugs — increased risk for indigestion, stomach ulcers, GI bleeding
      2. Benzodiazepines — increased risk for falls and confusion; long half-life
      3. Drugs with anticholinergic effects (e.g., amitriptyline, dicyclomine, oxybutynin) — increased risk for confusion, constipation, urinary retention, blurred vision, low blood pressure
      4. Muscle relaxants — increased risk for falls and confusion, constipation, urinary retention
      5. Certain diabetes medications: sulfonylureas (e.g., glyburide, chlorpropamide) — increased risk for hypoglycemia
10. Benefits and risks should always be considered; needed treatment for symptoms and conditions should not be withheld based solely on age
Questions

1. The predominant estrogen after menopause is:
   a. estradiol.
   b. estriol.
   c. estrone.
   d. estrioporate.

2. A 51-year-old female asks you if she should take estrogen to help her memory because she is sometimes forgetful and has difficulty concentrating. Her mother had dementia at age 65. The best initial response would be to:
   a. advise her that she may benefit from taking estrogen for about five years.
   b. ask about other menopausal symptoms such as hot flashes and night sweats.
   c. tell her the WHIMS study showed an increase in dementia for women her age who took estrogen.
   d. tell her that her memory changes are likely caused by depression.

3. A 58-year-old female with vaginal dryness causing irritation and dyspareunia has no problem with hot flashes. Of the following treatment choices, the best for her would be:
   a. continuous-combined regimen hormone therapy (HT).
   b. continuous-cyclic HT with added testosterone.
   c. low-dose estrogen vaginal ring.
   d. progestin-only therapy.

4. Which of the following lab values would be expected with menopause?
   a. Decreased FSH, increased LH, decreased estradiol
   b. Decreased LH, increased FSH, increased estradiol
   c. Increased FSH, increased LH, decreased estradiol
   d. Increased LH, decreased FSH, increased estradiol

5. A 52-year-old female who had a hysterectomy two years ago for dysfunctional uterine bleeding presents with complaints of severe hot flashes and night sweats for the past few months. Of the following treatment choices, the most appropriate for her vasomotor symptoms at this time would be:
   a. continuous-combined oral HT.
   b. ospemifine (estrogen agonist/antagonist).
   c. transdermal estrogen patch.
   d. vaginal estrogen cream.

6. Which of the following is not an FDA-approved indication for the use of HT?
   a. Prevention of cardiovascular disease
   b. Prevention of osteoporosis
   c. Relief of moderate to severe symptoms of vulvovaginal atrophy
   d. Relief of moderate to severe vasomotor symptom

7. Which of the following would not be an expected pelvic examination finding in a 70-year-old woman?
   a. Narrow vaginal canal
   b. Palpable ovaries
   c. Small uterus
   d. Thin vaginal walls

8. A major ovarian peptide that contributes to FSH regulation is:
   a. anti-müllerian hormone
   b. inhibin B
   c. progesterone
   d. prostaglandin

9. Based on data from the 2012 NIH Osteoporotic Fractures Study, the most appropriate screening follow-up for a woman with a normal bone mineral density test at age 65 would be to repeat screening at age:
   a. 66.
   b. 67.
   c. 70.
   d. 80.

10. A 70-year-old woman at the clinic for a well-woman exam in November has the following immunization history: herpes zoster vaccine, 13-valent pneumococcal conjugate vaccine (PCV13), and tetanus-diphtheria-pertussis (Tdap) booster at age 65. She has not had any vaccinations in the past five years. At this visit, recommended vaccinations include:
    a. herpes zoster, influenza, 23-valent polysaccharide pneumococcal vaccine (PPSV23).
    b. influenza.
    c. influenza, PPSV23.
    d. herpes zoster, influenza, tetanus-diphtheria (Td) booster.

11. When comparing conjugated estrogen combined with bazedoxifene (CE/BZA) to conjugated estrogen combined with medroxyprogesterone acetate (CE/MPA), data have shown:
    a. better prevention of bone loss with CE/BZA.
    b. less prevention of hot flashes with CE/BZA.
    c. less unscheduled bleeding with CE/BZA.
    d. more breast tenderness with CE/BZA.

12. An advantage of continuous-combined HT over continuous-cyclic HT regimens is:
    a. no estrogen-free period during which vasomotor symptoms can occur.
    b. predictable withdrawal bleeding each month.
    c. lower cumulative dose of progestin.
    d. less negative impact on triglyceride levels.

13. An advantage of the transdermal patch over oral delivery of estrogen for the woman experiencing menopausal symptoms is that the transdermal delivery method:
    a. does not require addition of a progestogen.
    b. has less adverse effects on coagulation factors.
    c. improves vulvovaginal symptoms more quickly.
    d. increases HDL-C and decreases LDL-C levels.

14. Which of the following women should have an endometrial biopsy/evaluation?
    a. Woman on continuous-cyclic HT regimen with amenorrhea
    b. Woman on continuous-cyclic HT regimen with bleeding starting last few days of progestogen administration each month
    c. Woman on continuous-combined HT regimen with irregular bleeding in the first year of use
    d. Woman on continuous-combined HT regimen with spotting that occurs after several months of amenorrhea

15. The woman who is going to take ospemifine for treatment of dyspareunia related to vulvovaginal atrophy should be advised that she:
    a. will need to take a progestogen in addition to prevent endometrial hyperplasia.
    b. may also use vaginal estrogen to further enhance effect.
    c. may experience hot flashes as a side effect of this medication.
    d. should take the medication two to three hours before having sexual intercourse.
16. The number one cause of death in U.S. women age 65 and older is:
   a. cancer.
   b. diabetes.
   c. heart disease.
   d. pneumonia.
17. Normal changes with aging include decreases in all for the following except:
   a. cerumen production.
   b. number of taste buds.
   c. sweat gland activity.
   d. tear production.
18. A 68-year-old female had her last cervical cancer screening done at age 65 and results were normal. She has no history of abnormal screenings. She has recently started having sexual intercourse with a new male partner and asks if she should start having cervical cancer screening again. An appropriate answer would be that she:
   a. does not need pap tests but should have HPV testing every five years.
   b. does not need to resume either pap tests or HPV testing.
   c. should have a pap test with HPV co-testing in five years and, if it is negative, can stop screening.
   d. should resume pap test with HPV co-testing every five years.
19. Expected physical findings with aging include:
   a. decrease in total body fat.
   b. increase in benign skin lesions.
   c. increase in resting heart rate.
   d. increase in liver size.
20. According to USPSTF recommendations, an 80-year-old female should have:
   a. a clinical breast examination and a screening mammogram annually.
   b. a clinical breast examination annually but no screening mammogram.
   c. neither a clinical breast examination nor a screening mammogram.
   d. a screening mammogram biennially but no clinical breast examination.
21. Which of the following estrogen therapy options does not require opposition by a progestogen in a woman with an intact uterus?
   a. Bioidentical oral estrogen formulation
   b. Estriol vaginal ring
   c. Plant-based (estriol) oral estrogen
   d. Transdermal estrogen patch
22. Which of the following statements regarding pain and pain management in elderly patients is correct?
   a. Age-related increase in excretion of drugs may require more frequent dosing of pain medications.
   b. Benzodiazepine medications such as alprazolam may be a better option than a pain medication.
   c. Elderly patients may have an increased response to painful stimuli compared to younger adults.
   d. Long-acting nonsteroidal anti-inflammatory drugs may be more likely to cause adverse gastrointestinal reactions in elderly patients.
23. Which of the following statements regarding depression in the elderly is correct?
   a. The Mini Mental Status Exam (MMSE) is a good screening tool for depression in elderly individuals.
   b. The elderly individual is more likely to have delusions or hallucinations with depression.
   c. No changes in cognition should be expected with the elderly individual who has clinical depression.
   d. The individual with a diagnosis of dementia may also have clinical depression.
24. A 53-year-old female asks you if increasing her soy product intake or taking an isoflavone supplement has any benefit for her now that she is menopausal. Information you would want to provide would include there is evidence to support increasing soy product intake may help to:
   a. improve memory and concentration in menopausal women
   b. prevent osteoporosis in menopausal women
   c. prevent skin changes that typically occur with aging
   d. reduce hot flash frequency and severity for some women
25. A menopausal female experiencing discomfort with sexual intercourse related to vaginal dryness wants to know whether she should use a vaginal lubricant or a vaginal moisturizer. Correct information to provide would include all of the following except:
   a. lubricants are intended to reduce friction during sex
   b. lubricants may take several weeks of use before becoming effective
   c. moisturizers provide longer-term relief of vaginal dryness than lubricants
   d. moisturizers are typically applied several times weekly

Answers with Rationales

1. c. estrone
   The predominant estrogen after menopause is estrone. Estrone is converted from androstenedione produced by the adrenal gland and ovarian stroma.
2. b. ask about other menopausal symptoms such as hot flashes and night sweats
   Although more history and physical examination may be warranted, the best answer choice is to initially ask about other menopausal symptoms such as hot flashes and night sweats. These vasomotor symptoms can contribute to memory impairment and difficulty concentrating as a result of sleep disturbance. If she has vasomotor symptoms, short-term hormone therapy may be an option.
3. c. low-dose estrogen vaginal ring
   The menopausal woman who has symptoms related to vulvar/vaginal atrophy and no vasomotor symptoms is best treated with local low-dose vaginal estrogen.
4. c. Increased FSH, increased LH, decreased estradiol
   During the menopause transition, there is a decreased production of estradiol as the number of responsive ovarian follicles decreases. This decrease in estradiol triggers the increased release of FSH and LH from the anterior pituitary gland.
5. c. transdermal estrogen patch
   The transdermal estrogen patch delivery method has no significant impact on HDL-C, LDL-C, triglycerides, or C-reactive protein. The
6. a. Prevention of cardiovascular disease
The FDA-approved indications for the use of hormone therapy include relief of moderate to severe menopausal symptoms related to estrogen deficiency (vasomotor instability, vulvar/vaginal atrophy), and prevention of osteoporosis.

7. b. Palpable ovaries
Three to five years after menopause, ovaries are atrophic and are usually not palpable.

8. b. Inhibin B
Inhibin B is a major ovarian peptide that rises and falls in the first half of the follicular phase, peaks midcycle, and falls to its lowest level in luteal phase. It forms a negative feedback loop to fine-tune pituitary FSH regulation.

9. d. 80
The 2012 NIH Osteoporotic Fractures Study findings suggest that women with a baseline normal BMD or mild osteopenia do not need frequent screening and can wait up to 15 years before re-screening. Less than 1% of women who initially had a normal BMD went on to develop osteoporosis during the 15 years of the study.

10. c. Influenza, PPSV23
Influenza vaccine is recommended annually. For individuals age 65 years and older a one-time dose of PCV13 is recommended, with one-time dose of PPSV23 at least one year later.

11. c. Less unscheduled bleeding with CE/BZA
Data indicate less unscheduled bleeding and less breast tenderness with CE/BZA than with CE/MPA.

12. c. Lower cumulative dose of progestogen
Estrogen and progestogen are taken every day with a continuous-combined HT regimen with lower cumulative dose of progestogen than a continuous-cyclic HT regimen in which estrogen is taken every day and larger doses of progestogen are added 10 to 14 days each month.

13. b. Has less adverse effects on coagulation factors
Estrogen delivered via a transdermal patch has no effect on cardiovascular markers (HDL-C, LDL-C, triglycerides, C-reactive protein). There is less effect on coagulation factors and a lower risk of venous thromboembolism with transdermal estrogen compared with oral estrogen in the menopausal woman.

14. d. Woman on continuous-combined HT regimen with spotting that occurs after several months of amenorrhea
Women using continuous-combined HT may initially have some unpredictable spotting and bleeding. After several months of use, the endometrium atrophies and amenorrhea usually results. If spotting or bleeding recurs after several months of amenorrhea, endometrial evaluation is warranted.

15. c. May experience hot flashes as a side effect of this medication
Ospemifene is a SERM taken as a daily oral dose to treat moderate to severe dyspareunia related to vulvovaginal atrophy. Hot flashes are a common side effect. Estrogen should not be used in combination with ospemifene. No studies have looked at using a progestogen with ospemifene.

16. c. Heart disease
Heart disease is the number one cause of death in women age 65 and older.

17. a. Cerumen production
There is an increase in cerumen production with aging. There is a decrease in number of taste buds, sweat gland activity, and tear production.

18. b. Does not need to resume either pap tests or HPV testing
The American Cancer Society, American College of Obstetricians and Gynecologists, and U.S. Preventive Services Task Force recommend no further cervical cancer screening in women age 65 and older following adequate negative prior screening and no history of CIN2 or more serious diagnosis. Screening should not be resumed even if the woman reports a new sexual partner.

19. b. Increase in benign skin lesions
Aging along with cutaneous sun exposure damage results in an increase in several types of benign skin lesions.

20. c. Neither a clinical breast examination nor a screening mammogram
The U.S. Preventive Services Task Force recommends against routine clinical breast examination at any age and recommends biennial mammograms from age 50 to 74.

21. b. Estring vaginal ring
Estring vaginal ring has little or no systemic absorption and does not require opposition by a progestogen.

22. d. Long-acting nonsteroidal anti-inflammatory drugs may be more likely to cause gastrointestinal adverse reactions in elderly patients. The decrease in protective mucus in the intestinal tract with aging may put elderly individuals at more risk for indigestion, stomach ulcers, and gastrointestinal bleeding with use of long-acting nonsteroidal anti-inflammatory drugs.

23. d. The individual with a diagnosis of dementia may also have clinical depression
Dementia and clinical depression may co-exist. Clinical depression may include mild cognitive changes such as inability to concentrate and indecisiveness but not the other changes associated with dementia. The Mini Mental Status Exam (MMSE) is a screening tool for dementia.

24. d. Reduce hot flash frequency and severity for some women
Data from a meta-analysis of 17 small randomized controlled trials (Taku, Melby, Kronenberg, Kurzer, & Messina, 2012) support the efficacy of soy products in reducing hot flash frequency and severity for some women. Inform women that soy products vary in composition and concentration.

25. b. Lubricants may take several weeks of use before becoming effective
Vaginal lubricants have an immediate effect and are intended to reduce friction on atrophic vulvovaginal structures during sex. Vaginal moisturizers are applied several times weekly for longer-term relief of vaginal dryness. Moisturizers help to maintain vaginal moisture and lower vaginal pH.
Menstrual and Endocrine Disorders

Premenstrual Syndrome (PMS)

• Definition—the cyclic occurrence, in luteal phase, of a group of distressing physical and psychological symptoms that begin about five to seven days before menses and resolve within about four days after onset of menses and that disrupt normal activities and interpersonal relationships

• Etiology/incidence
  1. Unknown etiology; multifactorial and multiorgan disorder; suggested causes include metabolic and endocrine disorders, alterations in estrogen or progesterone levels, withdrawal of endogenous endorphins, fluid imbalance, vitamin and mineral deficiencies, and altered carbohydrate metabolism
  2. Prevalence may be greater than 50%, with most women not requiring treatment; severe cases occur in 3–10% of women with PMS

• Signs and symptoms
  1. Symptoms recur cyclically in the luteal phase with symptom-free period in the follicular phase
  2. Range from mild to severe; result in interference with normal activities and personal relationships
     a. Physical
        (1) Headache
        (2) Breast changes
        (3) Fluid retention
        (4) Swelling
        (5) Abdominal bloating
        (6) Nausea/vomiting
        (7) Alterations in appetite
        (8) Food cravings
        (9) Lethargy/fatigue
        (10) Exacerbations of preexisting conditions, such as asthma
     b. Psychological
        (1) Irritability
        (2) Depression
        (3) Anxiety
        (4) Sleep alterations
        (5) Inability to concentrate
        (6) Anger
        (7) Violent behavior
        (8) Crying
        (9) Confusion
        (10) Changes in libido

• Physical findings—no specific physical findings

• Differential diagnosis
  1. A diagnosis of exclusion; all others must be ruled out
  2. Depression and/or anxiety
  3. Bipolar affective disorder
  4. Alcohol or substance abuse
  5. Personality disorders
  6. Chronic fatigue syndrome
  7. Fibromyalgia
  8. Diabetes
  9. Brain tumor
  10. Thyroid disease
  11. Hyperprolactinemia
  12. Perimenopause

• Diagnostic tests/findings
  1. Documentation of symptoms in a diary fashion for two to three months to evaluate for symptom consistency with ovulation and menses; retrospective recall is inaccurate
  2. Individualized testing, based on symptoms, may include glucose tolerance test and thyroid profile; hormone levels of little value
• Management/treatment

1. Nonmedical management
   a. No standard treatment; goals are to isolate symptom groups from history and diary and to treat symptomatically
   b. Options for treatment
      (1) Self-help strategies recommended as first-line therapy; help client understand the possible causes of symptoms, reassuring her that no serious health threats exist, and there are no quick cures; patience and team effort are key
      (2) Little evidence to support helpfulness of dietary revisions such as restriction of salt and refined sugar or limiting caffeine
   c. Vitamin B6 (50 to 150 mg/day) may be beneficial—continuous, not intermittent, use
   d. Calcium carbonate supplementation of 1,200–1,600 mg a day shown in randomized placebo-controlled trial to reduce PMS symptoms
   e. Chaste tree berry extract shown in placebo-controlled trial to reduce PMS symptoms
   f. Aerobic exercise 20 to 30 minutes at least four times a week
   g. Avoidance of known physical or emotional triggers
   h. Cognitive therapy, group therapy, relaxation therapy may improve physical and psychological symptoms
   i. Self-help, support groups, biofeedback, acupuncture/acupressure, light therapy may help some women

2. Medical management
   a. Selection of medications based on type and intensity of symptoms
   b. Spironolactone during luteal phase to reduce swelling and bloating
   c. Nonsteroidal anti-inflammatory drugs (NSAIDs) (antiprostaglandins) menstrually and premenstrually may reduce fluid retention and breast, lower back, abdominal, pelvic pain
   d. Combined oral contraceptives (consider continuous or extended use regimens), other combination or progestin-only contraceptive methods may be helpful in decreasing physical symptoms by suppressing ovulation and/or reducing menstrual bleeding and pain
   e. Selective serotonin reuptake inhibitors (SSRIs) have been shown to alleviate severe PMS; may choose to take only in luteal phase each month
   f. Danazol may improve PMS symptoms by suppressing ovulation; has significant androgen-related side effects
   g. Gonadotropin-releasing hormone (GnRH) agonists to inhibit cyclic gonadotropin release; has significant menopause-like side effects; long-term therapy may predispose to heart disease or osteoporosis; limit use to four to six months unless combined with combination hormonal therapy

• Premenstrual dysphoric disorder (PMDD)
   1. At least five PMS-type symptoms severe enough to disrupt normal functioning markedly in most if not all menstrual cycles
   2. Occurs in luteal phase and resolves within one week after menses
   3. Must include at least one of these symptoms: markedly depressed mood, marked anxiety, marked affective lability, persistent and marked anger
   4. Prevalence, 3–10% of reproductive-age women
   5. Treatment
      a. Same therapeutic interventions as for PMS
      b. Medications with FDA approval for treatment of PMDD include drospirenone containing combination hormonal contraceptives and the SSRIs fluoxetine, paroxetine, sertraline
      c. Anxiolytic drugs (alprazolam, buspirone)—mixed results in PMDD treatment studies; high potential for drug dependence/abuse; use only short-term

Dysmenorrhea

• Definition

1. Painful menstruation—a sensation of cramping in lower abdomen occurring or just before menses; most severe on first day, usually lasts two days, may radiate to back and thighs
2. Primary—dysmenorrhea occurs unassociated with underlying pelvic pathology; rarely begins after age 20 years; associated with ovulatory cycles; is stimulated by prostaglandin release
3. Secondary—an underlying pelvic pathologic condition thought to be the cause; may occur at any age in menstruating women

• Etiology/incidence

1. Primary—seen in 50–75% of all menstruating women, with 10–20% severe; prostaglandins stimulate contractile response on smooth muscles
2. Secondary—onset may be many years after menarche; most often in women older than age 20 years; organic disease is related

• Signs and symptoms

1. Primary
   a. Pain begins shortly before the onset of menses and usually lasts no longer than two days
   b. Described as colicky, crampy, and spasmodic pain in the lower abdomen, sometimes radiating to lower back and thighs
   c. May interfere with work or school (15–29%)
2. Secondary
   a. Pain may begin at any time during the cycle; may notice change in duration and amount of menstrual flow
   b. Unlikely to be relieved by over-the-counter measures
   c. Symptoms often persist longer than primary; related to organic pathology

• Physical findings

1. Primary—characterized by no abnormalities found on examination
2. Secondary—has findings consistent with pathologic condition

• Differential diagnosis

1. Imperforate hymen
2. Endometriosis
3. Cervical stenosis
4. Uterine abnormalities
5. Pelvic infection
6. Ovarian cysts
7. Pelvic congestion
8. Chronic pelvic pain
9. Adhesions
10. Infibulation—type of female genital cutting that includes narrowing of the vaginal orifice
11. Sexually transmitted infections
12. Urinary tract infections

- Diagnostic tests/findings
  1. Primary—no specific tests are ordered
  2. Secondary
     a. Analyze pain description to help determine etiology
     b. Tests according to history and physical examination findings may include:
        (1) Vaginal ultrasound and hysterosalpingogram to evaluate pelvic structures
        (2) Laparoscopy to evaluate endometrial cavity
        (3) Cultures, smears to evaluate infections
        (4) Lower gastrointestinal (GI) evaluation
  3. Management/treatment
     1. Primary
        a. Prostaglandin synthetase inhibitors, NSAIDs are treatment of choice; best if begun at onset of menses, continuing for 48 to 72 hours; choices shown to be effective are mefenamic acid, naproxyn sodium, ibuprofen, and indomethacin
        b. Combination hormonal contraceptives (CHCs) are good choices if contraception is needed; act by reducing prostaglandins and menstrual flow; may consider extended or continuous dosing regimens
        c. Progestin-only contraceptives may also relieve symptoms by decreasing or eliminating menstrual bleeding—depot medroxyprogesterone acetate (DMPA), progestin implant, levonorgestrel-releasing intrauterine system (LNG-IUS)
        d. Self-help measures include regular exercise, warm heat, relaxation exercises
     2. Secondary treatment consistent with pathology

Amenorrhea

- Definition
  1. Absence of menses during reproductive years
  2. Primary—no menstruation previously; no menstruation by age 14 years in absence of development of secondary sex characteristics; no menstruation by age 16 years regardless of secondary sex characteristics
  3. Secondary—absence of menses in a previously menstruating woman; no menses for three to six months in a woman who usually has normal periods or for a length of time equivalent to three cycles
  4. A symptom, not a diagnosis

- Etiology/incidence
  1. Incidence is approximately 5% in women who are not pregnant, lactating, or menopausal
  2. Disorders of genital outflow tract—for example, vaginal agenesis, imperforate hymen, cervical stenosis
  3. Endocrine disorders—for example, hyperthyroidism, hyperprolactinemia, hyperandrogenism, ovarian failure, polycystic ovarian syndrome
  4. Congenital and chromosomal abnormalities—for example, Turner’s syndrome, androgen insensitivity/resistance syndrome, congenital adrenal hyperplasia
  5. Anorexia nervosa
  6. Excessive exercise/competitive sports training
  7. Obesity

8. Malnutrition
9. Medications—for example, hormones, hormonal contraception, antipsychotics, cancer chemotherapeutic agents
10. Chronic illness—for example, tuberculosis, alcohol or other substance abuse, type 1 diabetes mellitus, disorders of adrenal glands
11. Asherman’s syndrome—irradiation or surgery resulting in destruction of endometrium
12. Sheehan syndrome—condition that may occur with massive hemorrhage during or after delivery, causing severe hypotension and pituitary necrosis resulting in hypopituitarism
13. Excessive or chronic stress

- Symptoms—absence of menses at the expected time; other related to etiology

- Physical findings
  1. Abnormal vital signs may indicate chronic illness
  2. Weight or body mass index (BMI) below normal may indicate malnutrition, anorexia nervosa, excessive exercise
  3. Abnormal visual fields may indicate a pituitary tumor
  4. Enlarged or nodular thyroid or may indicate thyroid disorder
  5. Delay in Tanner stage progression (breast development, pubic hair development) may indicate altered pubertal development
  6. Galactorrhea may indicate hyperprolactinemia
  7. Hirsuitism, acne, clitoral enlargement may indicate androgen excess
  8. Vaginal atrophy may indicate lack of estrogen, ovarian failure
  9. Imperforate hymen, cervical stenosis, female genital cutting may be causes of outflow tract disorder
10. Enlarged uterus may indicate pregnancy

- Differential diagnosis
  1. Pregnancy
  2. Menopause
  3. Anorexia nervosa
  4. Intensive physical activity/training
  5. Disorders of ovary, anterior pituitary, and/or hypothalamus
  6. Congenital or acquired anatomic disorders
  7. Chronic illness
  8. Medication effects

- Diagnostic tests/findings
  1. Pregnancy test
  2. Serum prolactin level
  3. Serum thyroid-stimulating hormone (TSH)
  4. If above tests are normal, may evaluate availability of estrogen with progestin challenge test
     a. Progestin each day for 10 to 14 days—wait for bleeding, which should occur within 7 to 14 days; will indicate adequate estrogen production and stimulation as well as no problem with outflow tract
     b. If no withdrawal bleed in two weeks, order FSH/LH
     c. If FSH and LH are low, the cause is likely hypothalamic or pituitary dysfunction
     d. If FSH and LH are high, the cause is likely ovarian failure/ menopause
  5. Determine karyotype if suspect ovarian insufficiency due to chromosomal defect
Management/treatment
1. Primary amenorrhea—refer to endocrinologist
2. Treat thyroid abnormalities or refer
3. If prolactin and TSH are normal and bleeding occurs after progestin challenge, initiate treatment for anovulation based on age, contraceptive needs, and lifestyle
4. Treatment may include combination hormonal contraceptives or cyclic progestins
5. Attain a normal weight/BMI and maintain
6. Referral for complicated secondary amenorrhea cause or undetermined etiology
7. Referral for ovulation induction if patient desires pregnancy

Infrequent Menstrual Bleeding
- Definition—infrequent uterine bleeding characterized by one or two bleeding episodes in a 90-day period; previously referred to as oligomenorrhea
- Etiology/incidence
  1. Occurs frequently in perimenopause
  2. Ovarian–pituitary–hypothalamus abnormalities
  3. Endocrine disorders such as thyroid or adrenal problems
  4. Systemic causes such as chronic illness, weight loss or gain, extreme stress, excessive exercise
  5. Drug use or abuse
- Signs and symptoms
  1. May alternate with episodes of amenorrhea or heavy vaginal bleeding
  2. May present as normal menstrual pattern during first year of menstruation or for several years before menopause
- Differential diagnosis
  1. Pregnancy
  2. Menopause
  3. Thyroid disorder
  4. Disturbance with hypothalamic–pituitary–ovarian axis
- Physical findings—consistent with pathology found in “Differential diagnosis” section
- Diagnostic tests/findings
  1. Pregnancy test
  2. Tests to evaluate function of thyroid, ovaries, pituitary, or hypothalamus (e.g., TSH, prolactin level, FSH/LH levels)
- Management/treatment
  1. If pregnant, discuss options
  2. Treat underlying cause (e.g., stress, weight—possibly refer to an endocrinologist)
  3. Prevent unopposed estrogen complications by giving progesterone therapy—medroxyprogesterone acetate 10 days of each month or combination hormonal contraceptives

Heavy and/or Prolonged Menstrual Bleeding
- Definition—heavy menstrual bleeding (HMB) is characterized by monthly blood loss volume of greater than 80 mL; prolonged menstrual bleeding is characterized by bleeding episodes lasting more than eight days; heavy and/or prolonged menstrual bleeding previously referred to as menorrhagia
- Classification and Terminology
  1. PALM is acronym for structural abnormalities that can cause abnormal uterine bleeding (AUB)—Polyps, Adenomyosis, Leiomyoma (submucosal), Malignancy and hyperplasia
  2. COEIN is acronym for nonstructural abnormalities that can cause AUB—Coagulopathy, Ovarian dysfunction, Endometrial, Iatrogenic, Not yet classified
- Etiology/incidence
  1. Often occurs at extremes of reproductive age—adolescence and perimenopause
  2. Gynecologic causes—leiomyoma, adenomyosis, endometrial and endocervical polyps, endometrial hyperplasia, cervical and endometrial cancers
  3. Inherited and acquired bleeding disorders—von Willebrand disease, idiopathic thrombocytopenia purpura, aplastic anemia, platelet dysfunction
  4. Disturbances of hypothalamic–pituitary–ovarian axis causing continuous endometrial stimulation
  5. Imbalance of prostaglandins favoring those that cause vasodilation over those that cause vasoconstriction
  6. Systemic diseases—hepatic disease, early renal failure, adrenal hyperplasia, thyroid dysfunction
  7. Medications—anticoagulants, some anticonvulsants, digitalis, non-hormonal intrauterine contraception, chronic aspirin or NSAID use
  8. Other—physical trauma, extreme stress, obesity
- Symptoms
  1. Women may have different definitions of what excessive bleeding is—it is relevant if it disrupts her life
  2. Symptoms vary with cause of bleeding
- Physical findings—depend on cause of bleeding, see section titled “Etiology/incidence”
- Differential diagnoses
  1. Pregnancy (ectopic or intrauterine)
  2. Gynecologic disorders
  3. Disturbances of hypothalamic–pituitary–ovarian axis
  4. Acquired or inherited bleeding disorders
  5. Systemic diseases
  6. Medication related
- Diagnostic tests/findings
  1. Pregnancy test
  2. Pap test for cervical cancer
  3. Complete blood count (CBC)
  4. FSH and LH to evaluate estrogen stimulation
  5. TSH
  6. Prolactin
  7. Sexually transmitted infection testing as indicated
  8. Endometrial evaluation—biopsy, transvaginal ultrasound, saline infusion sonohysteroscopy
  9. Coagulation studies if indicated
- **Management/treatment**
  1. **Hormonal**
     a. Acute excessive bleeding—parenteral estrogen or high-dose oral estrogen gradually tapered, then medroxyprogesterone acetate (MPA) added last 10 days to initiate withdrawal bleeding; high-dose oral progesterin therapy gradually tapered
     b. Moderate bleeding, not currently bleeding, and maintenance control—LNG-IUS is FDA approved for treatment of HMB; combination hormonal contraceptives cyclic, extended, or continuous regimens; DMPA; cyclic MPA
  2. **Nonhormonal**
     a. Treat anemia
     b. NSAIDS—start at menses onset and continue for five days or until cessation of menstruation; increases ratio of vasoconstrictive prostaglandins to vasodilating prostaglandins
     c. Tranexamic acid—antifibrinolytic agent that blocks lysis of fibrin clots; take up to the first five days of menses; decreases blood loss in women who have increased endometrial plasminogen activity; side effects: nausea, leg cramps; contraindicated in women with history of or at risk for thrombosis
  3. **Surgical management**
     a. Hysterectomy
     b. Endometrial ablation
     c. Dilatation and curettage (D&C) is diagnostic and therapeutic

**Polycystic Ovarian Syndrome (PCOS)**
- **Definition**—a symptom complex associated with menstrual irregularity due to oligo-ovulation or anovulation and clinical or biochemical signs of hyperandrogenism
- **Etiology/incidence**
  1. Etiology is unclear
  2. Theories include
     a. Genetic factors—autosomal dominant transmission
     b. Endocrine factors—increased LH:FSH ratio; increased androgen concentrations; decreased sex-hormone-binding globulin (SHBG) with resultant increase in free testosterone
     c. Metabolic factors—hyperinsulinemia associated with increased insulin resistance; insulin has effects at both the ovarian stroma and the follicle; can have a significant impact on promoting or disrupting follicles
  3. Approximately 25% of normal women will demonstrate ultrasonographic evidence typical of polycystic ovaries
  4. Prevalence in reproductive women is approximately 6–7% (most common endocrine disorder in this population)
  5. Women with PCOS are at risk for future development of endometrial cancer, diabetes mellitus, and heart disease; obesity increases risk of metabolic complications
- **Symptoms**
  1. Irregular menses (amenorrhea or infrequent menstrual bleeding)—> 90%
  2. Gradual onset of hirsutism around puberty or in early 20s—50–70%
  3. Other signs of androgen excess—acne, deep voice, male pattern baldness—15–25%
  4. Infertility

**Physical findings**
1. Physical findings may be normal
2. Ovaries may not always be palpable—50% will have enlarged ovaries
3. Virilization—hirsutism, increased muscle mass, frontal balding, enlargement of clitoris, deepening of voice, and decreased breast size
4. Abdominal obesity (> 35 inches)—50–60%
5. Acne
6. Acanthosis nigricans and skin tags, usually in neck area
- **Differential diagnosis**
  1. Obesity
  2. Hyperprolactinemia
  3. Thyroid dysfunction
  4. Cushing’s disease
  5. Adrenal or ovarian tumors
- **Diagnostic tests/findings**
  1. Pregnancy test
  2. Prolactin
  3. TSH level
  4. Determinants of biochemical hyperandrogenism—Serum total testosterone and SHBG or bioavailable and free testosterone; mild to moderate elevation; controversial over need if adult patient has clinical signs of hyperandrogenism unless rapid progression or severe; consider for adolescent patients as may have acne with normal androgen levels
  5. Serum 17-hydroxyprogesterone (17-OHP)—greater than 800 ng/dL with PCOS; if lower values, evaluate for nonclassical or late-onset congenital adrenal hyperplasia
  6. Endometrial biopsy—to rule out hyperplasia
  7. Assess ovaries with ultrasonography
  8. Laparoscopy to determine and manage fertility
  9. Glucose and lipid levels
- **Rotterdam Criteria for Diagnosis of PCOS—at least two of three of the following in adult female; all three present in adolescent female to include biochemical confirmation of hyperandrogenism**
  1. Oligo/anovulation
  2. Clinical/biochemical hyperandrogenism
  3. Polycystic ovaries
- **Management/treatment**
  1. Goal is to lower androgen levels, treat current clinical manifestations, and decrease risk for long-term effects of hyperandrogenism
  2. May be determined by desire for pregnancy and symptom patterns
  3. If pregnancy is desired, refer to reproductive endocrinologist
  4. If pregnancy is not desired and patient wants contraception, direct therapy on prevention of endometrial hyperplasia and pregnancy
     a. Low-dose combined hormonal contraception with low androgenicity—inhibits LH secretion and LH-dependent ovarian androgen production, increases SHBG binding free testosterone, regulates menstrual cycles, protects from endometrial cancer
     b. Progestin contraceptives—protect from endometrial cancer
5. If patient does not desire and is not at risk for pregnancy, and does not want to use hormonal contraception, focus on prevention of endometrial hyperplasia
   a. Endometrial biopsy may be indicated
   b. Medroxyprogesterone acetate for 10 days of month induces withdrawal bleeding
6. Monitor for diabetes and hyperlipidemia
7. Weight loss if obese
8. Insulin-sensitizing agents—metformin
9. Excess hair removal—mechanical or eflornithine HCl topical cream for facial hair

Endometriosis

- Definition—the presence of endometrial stroma and glands outside uterus

- Etiology/incidence
  1. Etiology is not clearly understood
  2. Possible causes include
     a. Retrograde menstruation (Sampson’s theory)
     b. Immunologic factors
     c. Genetics
     d. Hormonal factors
  3. Found in 5–15% of surgeries performed on reproductive-age women and up to 30% of infertile women
  4. Typical patient is 20 to 30 years old, Caucasian, nulliparous (60–70%)
  5. Occurs in all races
  6. Seven percent to 10% of premenopausal women are affected; most common cause of chronic pelvic pain
  7. Endometriosis has been found in areas other than the pelvis, such as lungs, nose, and spinal column; most common sites are cul-de-sac, ovary, posterior uterus, and uterosacral ligaments
  8. Majority have a positive family history

- Symptoms
  1. Wide range of clinical symptoms; severity does not correlate with extent of disease
  2. Most common complaints
     a. Dysmenorrhea
     b. Infertility
     c. Prenomenstrual spotting
     d. Menorrhagia
     e. Pelvic pain
     f. Dyspareunia
  3. Symptoms seen less often include
     a. Low back pain
     b. Diarrhea
     c. Dysuria
     d. Hematuria
     e. Difficult or painful defecation
     f. Rectal bleeding
  4. Symptoms classically occur before or during menses
  5. Pain may be localized to involved area

- Physical findings
  1. Fixed, retroverted uterus
  2. Bilateral, fixed, tender adnexal masses
  3. Nodularity and tenderness of uterosacral ligaments and cul-de-sac
  4. Tenderness, thickening, and nodularity of rectal–vaginal septum
  5. Lesions may be visible on laparoscopy or laparotomy
  6. Cervical motion tenderness associated with menses

- Differential diagnosis
  1. Chronic pelvic inflammatory infection
  2. Acute salpingitis
  3. Adenomyosis
  4. Ectopic pregnancy
  5. Benign or malignant ovarian neoplasm

- Diagnostic tests/findings
  1. Direct visualization with laparoscopy or laparotomy reveals classic implants; classified as Stage I: minimal, Stage II: mild, Stage III: moderate, Stage IV: severe
  2. CT and MRI provide only presumptive evidence
  3. CA-125 levels correlate with degree of disease and response to therapy; cannot be used for diagnosis because of low sensitivity and specificity

- Management/treatment
  1. No medical management provides universal cure; goal is to relieve pain, restore fertility, and prevent progression
  2. Medical management includes
     a. Analgesics (NSAIDs are first choice)
     b. GnRH agonists and danazol induce regression of endometrial implants
     c. Progestins—Sub Q 104 DMPA is FDA approved for treatment; IM DMPA also effective
     d. Continuous use of combined oral contraceptive pills produces atrophy of implants and acyclic hormone environment
     e. Laser surgery may be employed
     f. Hysterectomy with bilateral salpingoophorectomy is curative
     g. May combine surgery and medication
  3. Key points
     a. May need long-term emotional support as a result of pain and infertility
     b. Delayed childbirth may lead to development of endometriosis
     c. Treatment is long term; may become a chronic illness
     d. Counsel regarding the risk of infertility

Adenomyosis

- Definition—benign condition in which ectopic endometrium is found within the myometrium; often considered a type of endometriosis

- Etiology/incidence
  1. May be related to breakdown of the endometrium during labor and delivery; the cells of the endometrial basal layer grow downward, losing connection with the endometrium
  2. Incidence varies widely from 10–90% of hysterectomies revealing adenomyosis
  3. Diagnosis most common in parous women between ages 40 and 50 years
Menstrual and Endocrine Disorders

Hyperprolactinemia, Galactorrhea, and Pituitary Adenoma

- Definitions
  1. Hyperprolactinemia—elevated levels of prolactin
  2. Galactorrhea—secretion of a nonphysiologic, milky fluid from the breast, unrelated to pregnancy
  3. Pituitary adenoma—benign tumor of pituitary; most common type secretes prolactin

- Etiology/incidence
  1. Etiology and incidence of pituitary adenoma is unknown; rarely malignant; can grow for years
  2. Prolactin-secreting adenomas account for 50% of all identified at autopsy
  3. Most pituitary adenomas occur in women younger than 40 years of age
  4. High prolactin level found in approximately one-third of women with amenorrhea of unknown origin; about one-third of women with secondary amenorrhea have pituitary adenoma; one-third of women with high levels of prolactin have galactorrhea
  5. Galactorrhea should be evaluated in a nulliparous woman or in a non-breastfeeding parous woman if 12 months has passed since last pregnancy

- Symptoms
  1. Hyperprolactinemia/galactorrhea
     a. Spontaneous clear or milky bilateral or unilateral breast secretions from multiple ducts
     b. Normal or irregular menses; secondary amenorrhea may occur
     c. Disturbances of vision and headaches may be present (if adenoma is cause)
  2. Pituitary adenoma
     a. Breast secretions
     b. Menstrual changes as described
     c. Severe vascular headaches and blurred vision

- Physical findings
  1. Normal funduscopic examination—if no adenoma
  2. Funduscopic examination may show papilledema if adenoma present
  3. Normal physical and gynecologic examination

- Differential diagnosis
  1. Pregnancy/breastfeeding
  2. Breast cancer
  3. Hypothyroidism, hyperthyroidism
  4. Pituitary adenoma
  5. Excessive breast stimulation
  6. Disorders or injury of chest wall
  7. Medication effect (e.g., opioids, cannabis, antidepressants)
  8. Disturbances of ovarian function
  9. Benign and malignant brain neoplasm

- Diagnostic tests/findings
  1. TSH
  2. Serum prolactin, refer if more than 20 ng/mL; if in 100 to 300 ng/mL range, very suspicious for adenoma
  3. Pregnancy test
  4. Microscopy of breast secretions—milk indicated by fat globules
  5. CT or MRI of sella turcica to rule out adenoma

- Management/treatment
  1. Management may be accomplished best by referral to a reproductive endocrinologist
  2. If prolactin level is less than 20 ng/mL and patient is not amenorrheic, may follow with yearly prolactin levels
  3. Pharmacologic
     a. Dopamine agonist (e.g., bromocriptine, which inhibits prolactin, provides symptomatic relief, decreases or stops galactorrhea); treatment of choice with highest cure
     b. Treat hypo-/hyperthyroidism
  4. Surgical
     a. If medical management has failed to relieve symptoms of adenoma, transphenoidal neurosurgery may be indicated
     b. Recurrence rate is 10–70%; requires close follow-up
  5. Radiation
     a. Results are less satisfactory than surgery
     b. May take several years for prolactin level to fall
     c. Should be reserved for recurrences or those not responsive to medical management
  6. Patient education
     a. Discontinue breast stimulation
     b. Disclose all drugs and medications being used
Benign and Malignant Tumors/Neoplasms

Cervical Polyps
- Definition—pedunculated growths arising from the mucosal surface of the endocervix
- Etiology/incidence
  1. Inflammation
  2. Trauma
  3. Pregnancy
  4. Abnormal local response to hypoestrogenic state
  5. Occurs in 4% of all gynecologic patients
  6. Most common benign neoplasm of the cervix; most often seen in perimenopausal and multigravida women between ages 30 and 50 years
  7. Malignant changes are rare
- Symptoms
  1. May be asymptomatic
  2. Leukorrhea
  3. Abnormal vaginal bleeding—intermenstrual, postcoital
- Physical findings
  1. Single or multiple, painless polypoid lesions at cervix
  2. Size ranges from a few millimeters to 2 to 3 cm
  3. Reddish-purple to cherry red in color; smooth and soft; bleeds easily
  4. Otherwise normal pelvic examination
- Differential diagnosis
  1. Adenocarcinoma
  2. Cervical carcinoma
  3. Prolapsed myoma
  4. Squamous papilloma
  5. Retained products of conception
  6. Sarcoma
- Diagnostic tests/findings
  1. Pap test to rule out premalignant cervical lesions or cancer
  2. Histologic evaluation of removed polyp to rule out cancer
- Management/treatment
  1. Removal of the polyp is usually curative—avoid during pregnancy
  2. Recur frequently

Leiomyomata Uteri (Fibroid, Myoma)
- Definition—nodular, discrete tumors varying in size from microscopic to large multiple, nodular masses; classified according to location
  1. Submucosal—protrude into the uterine cavity
  2. Subserosal—bulge through the outer uterine wall
  3. Intraligamentous—within the broad ligament
  4. Interstitial (intramural)—stays within the uterine wall as it grows; most common form of myoma
  5. Pedunculated—on a thin pedicle or stalk attached to the uterus
- Etiology/incidence
  1. Etiology unknown
  2. May arise from smooth muscle cells in the myometrium
  3. Most common benign gynecologic pelvic neoplasm
  4. Affects approximately 20% of women in their reproductive years
  5. Occurs more frequently in African American women than in Caucasian
  6. Asymptomatic fibroids may be seen in 40–50% of women older than age 40
  7. Increased family incidence
- Symptoms
  1. Usually asymptomatic
  2. Heavy or prolonged menstrual bleeding
  3. Pelvic pain presents as dysmenorrhea, pelvic pressure, or dyspareunia; if pedunculated, twisted, and infarcted, may cause acute pain
  4. Large fibroids may cause constipation; intestinal obstruction may result from compression; venous stasis may occur from pressure; pressure on bladder may result in urinary retention or overflow incontinence
- Physical findings
  1. Abdominal enlargement
  2. Enlarged, irregularly shaped, firm uterus; may be displaced
  3. Pedunculated tumor may protrude from cervix
  4. Tumors usually painless on palpation
  5. Wide variance in size (3 to 4 mm, up to 15 lb)
  6. Potential complications
    a. Spontaneous abortion
    b. Premature labor
    c. Anemia
    d. Infertility
- Differential diagnosis
  1. Ovarian mass (benign or malignant)
  2. Pregnancy
  3. Leiomyosarcoma
  4. Uterine malignancy
  5. Adenomyosis
  6. Endometriosis
  7. Colon or rectal tumor (benign or malignant)
- Diagnostic tests/findings
  1. Pap test to rule out cervical cancer
  2. Pregnancy test
  3. CBC if anemia suspected
  4. Occult blood test if rectal or colon symptoms or gastrointestinal problems
  5. Endometrial biopsy or D&C when abnormal bleeding present
  6. Ultrasound, sonohysterogram, CT, MRI confirm diagnosis
  7. Hysteroscopy to provide visualization of uterine cavity
Symptoms

1. Functional cysts
   a. Usually asymptomatic
   b. May cause irregular menses
   c. Acute pain if ruptures or if torsion occurs
   d. Large cysts may cause pelvic pressure, feeling of fullness or heaviness, and dull ache on affected side

2. Dermoid (benign cystic teratoma)
   a. Usually asymptomatic
   b. Acute pain if twists or ruptures; may experience peritonitis
   c. May cause vague feelings of local pelvic pressure if large
   d. Abnormal uterine bleeding (rare)

3. Signs of rupture include severe, sudden abdominal pain; mimics ruptured ectopic pregnancy

Physical findings

1. Functional cysts are usually 5 cm or less in diameter; cystic to firm, mobile, sometimes tender, usually unilateral
2. Dermoid cysts may measure 5 to 10 cm; usually unilateral, firm to cystic, often anterior to uterus

Differential diagnosis

1. Pregnancy; ectopic pregnancy
2. Ovarian torsion
3. Uterine fibroid; endometrioma
4. Tubo-ovarian abscess
5. Diverticulitis/abscess
6. Distended bladder
7. Congenital anomaly (pelvic kidney)
8. Lymphadenopathy
9. Malignant neoplasm (most often in older women)

Diagnostic tests/findings

1. Pregnancy test
2. Transvaginal ultrasound—to evaluate mass: cystic or solid, complex or simple, bilateral or unilateral; to rule out ectopic pregnancy
3. CA125—only in postmenopausal women; not diagnostic
   a. Tumor-associated antigen most commonly used to monitor clinical status of woman with ovarian cancer
   b. Not routinely used for evaluation of adnexal mass in premenopausal women because of low specificity for ovarian cancer; several other conditions may cause elevated levels
   c. Specificity and predictive value are consistently higher in postmenopausal women
4. MRI may be useful if suspect dermoid cyst

Management/treatment

1. Functional cyst
   a. In reproductive years; less than 10 cm in diameter and ultrasound findings of simple cyst; examine after next menses and/or serial ultrasounds every four to 12 weeks
   b. Combination hormonal contraceptives will not help in resolution but may be used to suppress gonadotropin levels to prevent recurrence

Ovarian Cysts

• Definition

1. Functional—cysts of the ovary that occur secondary to hormonal stimulation
   a. Follicular—occur in the follicular phase of the menstrual cycle when continued hormonal stimulation prevents fluid resorption
   b. Corpus luteum—occur in the luteal phase, when corpus luteum fails to degenerate
2. Dermoid (benign cystic teratoma)—most common ovarian germ cell tumor

• Etiology/incidence

1. Follicular cysts
   a. Rare before menarche or after menopause
   b. Account for 20–50% of ovarian cysts; most common adnexal mass in reproductive years
   c. Often found incidentally during routine pelvic examination or ultrasound
   d. Usually resolves in two to three menstrual cycles; may rupture or undergo torsion causing pain
2. Corpus luteum cysts
   a. Forms following the failure of the corpus luteum to degenerate after 14 days
   b. May hemorrhage into the cystic cavity
3. Dermoid cysts (benign cystic teratoma)
   a. One of the most common neoplasms of the ovary (10–20%)
   b. Occurs during the reproductive years
   c. Composed usually of well-differentiated tissue from all three germ layers
   d. Usually measures 5 to 10 cm in diameter; 10–15% are bilateral

• Management/treatment

1. May require no treatment if asymptomatic
2. Periodic observation and follow-up with bimanual examination may be indicated to ensure that tumors are not growing or undergoing abnormal changes
3. Pharmacologic
   a. GnRH agonist results in 40–60% reduction in volume; regrowth occurs about half the time; may be used to reduce volume preoperatively, before attempting pregnancy, when surgery is contraindicated, or in perimenopausal women to avoid surgery
   b. Progestational agents such as medroxyprogesterone acetate (MPA) may decrease fibroid size and bleeding
   c. Treat anemia if indicated

4. Surgical
   a. Indications for surgery
      (1) Abnormal bleeding
      (2) Rapid growth
      (3) Definitive diagnosis concerning mass if otherwise uncertain
      (4) Encroachment of organs
   b. Hysterectomy when symptoms cannot be controlled
   c. Myomectomy through hysteroscopic resection can preserve fertility; up to 30% recurrence with this method

5. Signs of rupture include severe, sudden abdominal pain; mimics ruptured ectopic pregnancy

6. Physical findings

7. Differential diagnosis

8. Diagnostic tests/findings

9. Management/treatment
c. Refer if mass greater than 10 cm, ultrasound findings of solid tumor or complex cyst, concerning symptoms, or persists greater than 12 weeks

d. Postmenopause—if mass less than 10 cm, ultrasound findings of simple cyst, no concerning symptoms or risk factors for ovarian cancer, and CA 125 less than 35 U per ml, serial ultrasound every 4 to 12 weeks

e. Postmenopause—refer if mass is greater than 10 cm, ultrasound findings of solid or complex cyst, concerning symptoms or risk factors, persists greater than 12 weeks, or CA125 greater than 35 U per ml

2. Dermoid cyst—doesn’t resolve on own, laparoscopic removal

Gynecologic Cancers

• Definition—cancers of the vulva, vagina, cervix, uterus, ovaries, and fallopian tubes

• Etiology/incidence—varies with type of cancer, age, personal and family history, and other modifiable and nonmodifiable risk factors

• Symptoms—vary with type and stage of cancer (see Table 6-1)

Cervical Carcinoma

• Definition—slow penetration of the basement membrane and infiltration of malignant cells into the uterine cervix; characterized by histologically definable stages

• Etiology/incidence

  1. Approximately 14,500 new cases diagnosed annually, with 4,000 to 5,000 deaths

  2. Highest incidence in Hispanics, then African Americans, then Caucasians

  3. Peak incidence between 45 and 55 years of age; increasing in young women

  4. Human papillomavirus (HPV) is the primary agent in the development of cervical intraepithelial neoplasia (CIN) and cervical cancer

  5. Risk factors

    a. Smoking

    b. Presence of HPV types with malignant potential (types 16, 18, and 31 most common)

    c. First coitus at early age (<18 years)

    d. Multiple sexual partners or sexual partners with multiple partners

    e. Nonbarrier method of contraception

    f. Immunosuppression

    g. Long-term oral contraceptive use

    h. Never had Pap test or infrequent Pap tests

• Symptoms

  1. May be asymptomatic

  2. Postcoital or irregular, painless bleeding

  3. Odorous bloody or purulent discharge

  4. Late symptoms

    a. Pelvic or epigastric pain

    b. Urinary or rectal symptoms

• Physical findings

  1. Appearance of cervix ranges from normal to severely ulcerated, necrotic, or large bulky lesion filling the vagina

  2. Cervix may be firm or rocklike to soft and spongy

  3. Sanguineous or purulent, odorous vaginal discharge

  4. Anemia if bleeding heavy

• Differential diagnosis

  1. Metastasis from another primary site

  2. Cervicitis/sexually transmitted infections

  3. Cervical polyp

  4. Cervical eczema

  5. Preinvasive lesion of cervix

  6. Condyloma acuminata

• Diagnostic tests/findings

  1. Pap test is gold standard for cost-effective screening

  2. Biopsy of gross lesions

  3. If malignancy is suspected but no gross lesion is visible, colposcopy is suggested with biopsy

  4. Colposcopic evaluation of vulva and vagina to rule out other lesions

  5. CT, MRI, cystoscopy, sigmoidoscopy, and barium enema may be indicated

• Management/treatment

  1. Management should be by a gynecologic oncologist involving staging, appropriate treatment, and follow-up

  2. Treatment may consist of surgery, radiation, chemotherapy, or a combination

### Table 6-1 Gynecologic Cancer Symptoms

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Cervical Cancer</th>
<th>Ovarian Cancer</th>
<th>Uterine Cancer</th>
<th>Vaginal Cancer</th>
<th>Vulvar Cancer</th>
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<tbody>
<tr>
<td>Abnormal vaginal bleeding or discharge</td>
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<td>Pelvic pain or pressure</td>
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<td>Abdominal or back pain</td>
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<td>Bloating</td>
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<td>Changes in bowel or bladder function</td>
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<tr>
<td>Itching or burning of the vulva</td>
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<td>Changes in vulvar color or changes in skin, such as rash, sores, or warts</td>
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Endometrial Carcinoma

- Definition—carcinoma of the body of the uterus; malignant transformation of endometrial glands and/or stroma
- Etiology/incidence
  1. Most common gynecologic malignancy—accounts for 90–95% of malignancies of the uterine corpus
  2. Thirty thousand new cases annually and 6,000 deaths
  3. Median age is 63 years at onset—5% occurring in women younger than age 40
  4. Several risk factors are linked to increased length of time or amount of exposure to estrogen, especially unopposed estrogen, either endogenous or exogenous
    a. Early menarche; late menopause
    b. Unopposed estrogen therapy
    c. Oligo-ovulation, anovulation
    d. Obesity
    e. Estrogen-secreting tumors (granulosa cell)
  5. Other risk factors include
    a. Family history of endometrial or colorectal cancer
    b. Personal history of colorectal cancer, diabetes or hypertension
  6. Protective factors—multiparity, use of oral contraceptive pills, use of depot medroxyprogesterone acetate (DMPA)
- Symptoms
  1. Painless vaginal bleeding is typically the first symptom
  2. Serous, odorous discharge (watery leukorrhea); soon replaced by bloody discharge; intermittent spotting; spotting to steady, painless bleeding; then hemorrhage
  3. Lower abdominal pain (10%)
- Physical findings
  1. Blood may be present in the vaginal vault
  2. Advanced disease may have pelvic mass present, ascites
  3. Anemia may be present
  4. Uterus may be enlarged and soft
- Differential diagnosis
  1. Atrophic vaginitis
  2. Cervical or endometrial polyps
  3. Benign endometrial pathology (hyperplasia)
  4. Anovulatory uterine bleeding
  5. Bleeding related to hormone therapy
  6. Leiomyomas
  7. Other genital/gynecologic cancers
- Diagnostic tests/findings
  1. Pap test may show glandular abnormalities
  2. Endometrial aspiration biopsy
  3. Ultrasound to measure endometrial stripe; if less than 5 mm thick, likelihood of endometrial cancer is rare
  4. Fractional dilatation and curettage is the gold standard for diagnosis
  5. Hysteroscopy may be useful in identifying lesions/polyps not found on biopsy
- Management/treatment
  1. Refer to gynecologist or oncologist
  2. Hysterectomy
  3. Surgical staging to determine treatment
  4. Radiation, chemotherapy, steroids (progesterone), or combination

Ovarian Carcinoma

- Definition—a malignant neoplasm of the ovary that may arise from ovarian epithelial, stromal or germ cells
- Etiology/incidence
  1. Epithelial ovarian carcinoma is the most common type (80–85%)
  2. Ovary may be site for metastasis from nonovarian cancers
  3. Eighth most common cancer in women; fifth leading cause of cancer-related death in women
  4. Highest mortality rate of all gynecologic cancers
  5. Approximately 22,000 new cases of ovarian cancer diagnosed and 14,000 deaths from ovarian cancer in 2016 (National Cancer Institute)
  6. Ovarian cancer rates are highest among women age 55 to 64
  7. Risk factors
    a. Lifetime risk in general population is one to two percent
    b. Family history in one first-degree relative—5% lifetime risk, risk increases with number of affected first- or second-degree relatives
    c. Inherited gene mutations are responsible for approximately 20 to 25% of ovarian cancers with most common mutations in BRCA1 or BRCA2 genes; lifetime risk associated with BRCA1 mutation is 39 to 46%, lifetime risk associated with BRCA2 mutation is 12 to 20%
    d. Other hereditary cancer syndromes associated with ovarian cancer are Lynch and Peutz-Jeghers; gene mutations in these syndromes often result in cancers that affect multiple organs
    e. History of breast, colon, or endometrial cancer.
    f. Early menarche; late menopause
    g. Nulliparity or first child after age 30
    h. Infertility
    i. Endometriosis
    j. Obesity
    k. Postmenopausal hormonal estrogen therapy
  8. Use of oral contraceptives reduces risk—protection lasts up to two decades after last use
  9. Breastfeeding is associated with reduced risk
- Symptoms
  1. Early
    a. Often asymptomatic
    b. Symptoms are often mild, vague, and inconsistent
    c. Abdominal discomfort or pain
    d. Pressure sensation on the bladder or rectum
    e. Pelvic fullness or bloating
    f. Vague gastrointestinal symptoms
  2. Late
    a. Increasing abdominal girth
    b. Abdominal pain
    c. Abnormal vaginal bleeding
    d. Gastrointestinal symptoms—nausea, loss of appetite, dyspepsia
• Physical findings
  1. Fixed, irregular, nontender adnexal mass—usually bilateral
  2. Ascites
  3. Pleural effusion and subclavicular lymphadenopathy if advanced

• Differential diagnosis
  1. Primary peritoneal cancer
  2. Benign ovarian tumor
  3. Endometriosis
  4. Functional ovarian cyst
  5. Ovarian torsion
  6. Pelvic kidney
  7. Pedunculated uterine fibroid

• Diagnostic tests/findings
  1. Pelvic ultrasonography/CT/MRI
  2. CA-125—elevated levels not diagnostic for ovarian cancers (elevations can occur with endometriosis, leiomyomata, pelvic inflammatory infection, hepatitis, and other malignancies); helpful to follow response to treatment with chemotherapy and subsequent follow-up
  3. Definitive diagnosis is made with laparotomy

• Management/treatment
  1. Surgical
    a. Total hysterectomy with bilateral salpingoophorectomy and omentectomy—establishes histologic staging and grading of tumor
    b. Goal is removal of as much tumor as possible
  2. Chemotherapy and/or radiation
  3. Rule out metastasis with diagnostic evaluation of other organ systems
  4. Consider genetic counseling and genetic testing if indicated for woman with ovarian cancer diagnosis to determine if family members may be at increased risk because of gene mutations; counseling and consideration of genetic testing for at-risk relatives
  5. Consider genetic counseling and genetic testing if indicated for woman assessed to be at high risk for hereditary breast and ovarian cancer syndrome because of personal or family cancer history; results may guide discussion of risk-reducing surgeries or increased monitoring

Vaginal Carcinoma
• Definition—abnormal proliferation of vaginal epithelium, with malignant cells extending below the basement membrane

• Etiology/incidence
  1. Comprises about 2% of gynecologic malignancies—vaginal cancer is the rarest of gynecologic cancers
  2. Mean age of diagnosis is 65 years, with a range of from 30 to 90 years
  3. Etiology is multifactorial—risk factors include presence of persistent HPV infection with high-risk types, other genital cancers, diethylstilbestrol (DES) exposure, prior radiation
  4. Vaginal intraepithelial neoplasm is thought to be a precursor
  5. Five-year survival ranges from 80% for stage I to 17% for stage V

• Symptoms
  1. May present with vaginal bleeding or odorous blood-tinged discharge—may cause pruritus
  2. May have palpable or visible mass or lesion
  3. Urinary problems if bladder involved

• Physical findings
  1. Early lesions are raised and granular, and may be white
  2. Late lesions are friable, granular, and cauliflower-like, and may be palpable; ulceration may be superficial or deep
  3. Most common site is upper one-third of vagina
  4. If lesion darkly pigmented, suspect melanoma

• Differential diagnosis
  1. Malignancy of another site extended or metastatic to the vagina
  2. Vaginitis
  3. Bleeding from uterus
  4. Ulceration from foreign object (pessary, tampon)

• Diagnostic tests/findings
  1. Pap test to evaluate for cervical cancer
  2. Colposcopy and biopsy of lesions
  3. For staging, use cystoscopy, proctosigmoidoscopy, IV urography, chest radiography, barium enema
  4. CT scan and MRI are used to evaluate metastasis

• Management/treatment
  1. Treatment should be by a gynecologic oncologist
  2. Accurate diagnosis and stage are to be determined before treatment is planned
  3. If lesion is precancerous (VAIN I, II, III), laser is appropriate
  4. Local excision (partial vaginectomy) may be appropriate for early lesions
  5. Radiation is mainstay of treatment
  6. Radical surgery may be followed with radiation

Vulvar Carcinoma
• Definition—proliferation of malignant cells of vulva

• Etiology/incidence
  1. Multifactorial
  2. Risk factors
    a. HPV infection with high risk types; seen in 30–50% of cases
    b. Multiple sexual partners
    c. Cigarette smoking
    d. Chronic irritation
    e. Vulvar dermatoses
  3. May be associated with other urogenital cancers
  4. Accounts for 1–2% of all gynecologic cancer deaths per year
  5. Vulvar malignancies arise from squamous cell carcinoma, melanoma, adenocarcinoma, basal cell carcinoma, and sarcomas
  6. Mean age 65 years, with a range from 30 to 90 years; incidence in young women is rising

• Symptoms
  1. May be asymptomatic
2. Lesion on vulva
3. Pruritus (most common), pain, burning, bleeding
4. Odorous discharge; may be blood tinged
• Physical findings
  1. White, red, or irregularly pigmented; ulcerated, flat, or wartlike; single or multiple lesion(s)
  2. Hyperkeratotic patches (leukoplakia)
  3. Excoration and erythema
  4. Most common sites are labia majora and minora
  5. Bartholin’s gland enlargement
  6. Ingual lymphadenopathy
• Differential diagnosis
  1. Vulvar dermatoses
  2. Atrophy
  3. Condyloma acuminata
  4. Vulvar infection/inflammation
  5. Lymphogranuloma inguinale
  6. Paget’s disease
• Diagnostic tests/findings
  1. Pap test, colposcopy to rule out other sites of disease
  2. Biopsy/wide resection to make definitive diagnosis
  3. CT and MRI, chest radiography to evaluate for metastasis
• Management/treatment
  1. Appropriate evaluation by a gynecologic oncologist
  2. Local excision
  3. Simple or radical vulvectomy
  4. Topical treatment—immunologic agents, chemotherapy
  5. Careful follow-up—recurrence is common

Choriocarcinoma
• Definition—a frankly malignant form of gestational trophoblastic disease or may be primary in the ovary
• Etiology/incidence
  1. Gestational trophoblastic disease
     a. May follow any gestational event—intrauterine or ectopic pregnancy, abortion (50%); hydatidiform mole (50%)
     b. Malignant transformation occurs in the chorion
     c. One of the few metastatic tumors that is curable
  2. Nongestational—mixed germ cell tumor of ovary occurring in childhood or early adolescence; unusual in ages 20 to 30 years
  3. Disseminates by blood to the lungs, vagina, brain, liver, kidneys, and gastrointestinal tract
• Symptoms—often masquerades as other disease as a result of metastasis to other organs
  1. Irregular vaginal bleeding—intermittent to hemorrhage; continuing after immediate postpartum period; uterine subinvolution
  2. Amenorrhea (from gonadotropin secretion)
  3. Hemoptyis, cough, dyspnea with lung metastasis
  4. Evidence of central nervous system metastasis—headache, dizziness, fainting
  5. Gastrointestinal—rectal bleeding/tarry stools
  6. Abdominal pain
  7. Hematuria from renal metastasis
• Physical findings
  1. Abdominal mass/ascites
  2. Blood in vaginal vault
  3. Vaginal or vulvar lesion may indicate metastasis
  4. Enlarged, soft uterus
  5. Abnormalities of multiple organs if metastatic
• Differential diagnosis
  1. May imitate other diseases—suspect strongly if follows a pregnancy event
  2. Intrauterine pregnancy
  3. Invasive mole
  4. Benign ovarian tumor
  5. Other gynecologic malignancies
• Diagnostic tests/findings
  1. Quantitative hCG
  2. Abnormal beta hCG regression titers following molar pregnancy
  3. CT scan abdomen, pelvis, and head
  4. Lumbar puncture may be necessary
  5. Chest radiography
• Management/treatment
  1. Should be managed by a gynecologic oncologist
  2. Treatment is usually with surgery and chemotherapy or chemotherapy alone
  3. Appropriate follow-up to monitor side effects, disease improvement, and recurrence
  4. Nonmetastatic: good prognosis; metastatic: good to poor prognosis

Vaginal Infections

Bacterial Vaginosis (BV)
• Definition—an alteration of the normal flora of the vagina with dominance of anaerobic bacteria
• Etiology/incidence
  1. Most common vaginal infection in the United States in women ages 15–44
  2. Loss of lactobacilli (hydrogen-peroxide-producing strains) results in elevated pH and subsequent overgrowth of bacteria; bacteria concentrations are 100- to 1,000-fold
  3. No single offending organism—Gardnerella vaginalis, Mycoplasma hominis, Bacteroides species, Haemophilus, Mobiluncus, Corynebacterium are among the anaerobes
  4. Not sexually transmitted; however, more common in women with new or multiple male or female partners; increased risk associated with shared sex toys and douching
  5. BV infection may increase risk for acquiring sexually transmitted infections such as HIV and herpes simplex virus 2 (HSV-2)
6. May be associated with intra-amniotic infection, postpartum and postoperative infection, complications after gynecologic surgery, endometritis, pelvic inflammatory disease (PID)

- **Symptoms**
  1. Most often asymptomatic
  2. Pruritus occasionally
  3. Heavy grayish, yellowish, whitish, malodorous discharge
  4. Rancid or fishy odor during menses and after sex

- **Physical findings**
  1. Homogenous, adherent, whitish-gray vaginal discharge
  2. Normal-appearing vulva and vaginal mucosa
  3. Discharge may coat vulva
  4. Presence of foul odor

- **Differential diagnosis**
  1. Trichomoniasis
  2. Candidiasis

- **Diagnostic tests/findings**
  1. Wet mount of vaginal secretions
  2. Presence of three of the following Amsel criteria is diagnostic
    a. Vaginal pH greater than or equal to 4.5
    b. Clue cells on saline wet mount (epithelial cells with borders obscured as a result of stippling with bacteria); 20% or greater of epithelial cells
    c. Homogeneous discharge, white, smoothly coating vaginal wall
    d. Positive "whiff test"—fishy amine odor of vaginal discharge before or after addition of 10% potassium hydroxide (KOH) (caused when anaerobic bacteria combined with KOH); may also have positive whiff test in the presence of blood, semen, and *Trichomonas*
  3. No increase in number of WBCs on wet mount is expected as BV is not an inflammatory infection
  4. Commercially available card tests for detection of elevated pH, presence of amine
  5. Gram stain reveals true clue cells, numerous abnormal bacteria
  6. Cultures for anaerobes are unnecessary

- **Management/treatment**
  1. Treatment is recommended for women with symptoms
  2. Metronidazole 500 mg orally for 7 days
  3. Metronidazole gel 0.75% one full applicator (5 g) intravaginally at bedtime for five days
  4. Clindamycin cream 2%, one full applicator (5 g) intravaginally at bedtime for seven days
  5. Alternative regimens
    a. Clindamycin orally for seven days
    b. Clindamycin ovules intravaginally at bedtime for three days
  6. Treatment of male sex partner does not change course of disease or prevent recurrences
  7. BV may be transferred between female sex partners
  8. Metronidazole may cause a disulfiram effect (flushing, vomiting) if taken when alcohol is consumed; counsel patient to avoid alcohol use during and for 24 hours after completion of metronidazole
  9. Side effects—metallic taste, nausea, headache, dry mouth, dark-colored urine
  10. Clindamycin cream is oil-based and might weaken latex condoms and diaphragms for five days after use; if using these methods for contraception, counsel patient to refrain from sexual intercourse until the conclusion of the treatment regimen
  11. Avoid douching because this may increase risk for relapse
  12. Treatment in pregnancy—see Chapter 7

**Trichomoniassis**

- **Definition**—vaginal infection caused by an anaerobic, flagellated protozoan parasite
- **Etiology/incidence**
  1. Pathogenesis unknown; humans are the only host
  2. Caused by the *Trichomonas* organism; survives best in a pH of 5.6 to 7.5
  3. Sexually transmitted; theoretically possible fomite spread, but unlikely
  4. Responsible for 25% of vaginal infections—females symptomatic (25%); men rarely symptomatic
  5. Risk factors include multiple sexual partners, presence of another STI, lack of condom use; women who exchange sex for payment and use injectable drugs are at a higher risk
  6. Use of barrier contraceptive methods may decrease prevalence
  7. May be associated with premature rupture of the membranes and preterm labor
  8. Infection may be found in endocervix, vagina, bladder, Bartholin's glands, and periurethral glands

- **Symptoms**
  1. Symptoms variable; most men and women infected with trichomoniasis are asymptomatic
  2. Copious, malodorous, yellowish-green discharge; vulva irritation; pruritus; and occasionally dysuria, urgency, frequency of urination, postcoital and intermenstrual bleeding

- **Physical findings**
  1. Erythema, edema, excoration of vulva may be seen
  2. Red speckles ("strawberry spots") on vagina and cervix (punctate lesions)
  3. Homogeneous, watery, yellowish-green, grayish, frothy vaginal discharge
  4. pH greater than or equal to 5.0
  5. Cervix may bleed easily when touched

- **Differential diagnosis**
  1. Bacterial vaginosis
  2. Candidiasis
  3. Trauma from foreign body

- **Diagnostic tests/findings**
  1. Saline wet mount (60–70% sensitive), higher sensitivity with immediate evaluation of wet preparation slide of vaginal secretions—motile trichomonads; increased number of WBCs
  2. Rapid tests (results in 10-45 minutes) on vaginal secretions (> 82% sensitive, > 97% specific)
  3. Definitive test—culture
4. Urine microscopic examination may reveal live trichomonads
5. Detection on Pap test—40% positive predictive value

• Management/treatment
  1. Metronidazole 2 g orally in a single dose
  2. Tinidazole 2 g orally in single dose
  3. Alternative regimen—metronidazole 500 mg orally twice daily for seven days
4. May cause a disulfiram effect (flushing, vomiting) if metronidazole or tinidazole is taken when alcohol is consumed; counsel patient to avoid alcohol use for 24 hours after completion of metronidazole or 72 hours after completion of tinidazole
5. All sexual partners should be treated
6. Repeat testing in women in three months for detection of reinfection
7. For treatment failures—exclude reinfection; consider treatment with metronidazole or tinidazole 2 g orally for seven days
8. Screen for other sexually transmitted infections as indicated
9. Encourage safer sex practices to reduce reinfection and chance of other STIs
10. Treatment in pregnancy—see Chapter 7

Vulvovaginal Candidiasis (VVC)

• Definition—inflammatory vulvovaginal process caused by the yeast organism, Candida species, which superficially invades the epithelium cells

• Etiology/incidence
  1. Second most common vulvovaginal infection—caused by Candida, a dimorphic fungus
  2. Seventy-five percent of women will have at least one episode in their reproductive years; 45% will have a second episode; 5% or less will have recurrent or intractable episodes
  3. C. albicans species is responsible 85–90% of the time; C. glabrata and C. tropicalis are responsible for majority of remaining infections and are more resistant to therapy
  4. Predisposing factors to candidal overgrowth include pregnancy, reproductive age, uncontrolled diabetes, immunosuppressive disorders, frequent intercourse, antibiotic use, high-dose corticosteroids

• Symptoms
  1. Irritation of vulva, pruritus, soreness, external dysuria
  2. Discharge may be thick, curdy, thin, or watery, with yeast odor
  3. Dyspareunia (upon penetration)

• Physical findings
  1. Discharge is usually adherent to the vaginal wall
  2. Erythema of vulva and vagina
  3. Cervix appears normal on speculum examination

• Differential diagnosis
  1. Trichomoniasis
  2. Bacterial vaginosis
  3. Vulvar dermatoses
  4. Allergic reaction
  5. Urethritis/cystitis

• Diagnostic tests/findings
  1. Wet mount of vaginal secretions with 10% potassium hydroxide (KOH) will reveal mycelia, spores, and pseudohyphae
  2. Vaginal pH usually normal (< 4.5); amine test negative
  3. Increased number of WBCs on wet mount
  4. Fungal culture confirms diagnosis—most often used with frequent recurrences or intractable episodes to determine Candida species

• Management/treatment
  1. Treatment indicated if
    a. Symptomatic
    b. Patient desires
    c. Is immunosuppressed
  2. Azole family of antifungals is usual treatment and more effective than nystatin
  3. Single dose or three-day topical azole regimens effective for uncomplicated VVC
  4. Fluconazole 150 mg orally in a single dose
  5. Treatment for recurrent VVC—if four or more symptomatic episodes in one year; usually no apparent predisposing factor; culture to determine if non-albicans Candida species; consider longer-duration therapy and maintenance regimens (several regimens suggested with both topical azoles and oral fluconazole); consider use of intravaginal probiotics

6. Key points
  a. Azole creams and suppositories are oil-based and may weaken latex condoms and diaphragms
  b. Treatment of partner is not recommended unless male has balanitis
  c. Severe VVC (extensive erythema, edema, fissure formation) usually requires 7- to 14-day topical azole regimen or repeat dose of fluconazole 72 hours after initial dose
  d. Women with uncontrolled diabetes or receiving corticosteroid therapy who have VVC may require 7- to 14-day treatment regimen
  e. Encourage use of cotton underwear
  f. Pregnancy—see Chapter 7

Sexually Transmitted Infections (STIs)

Chlamydia

• Definition—infection of epithelial cells of the genital tract of men and women; may cause pneumonia and/or conjunctivitis in neonates

• Etiology/incidence
  1. Caused by an intracellular organism, Chlamydia trachomatis, which replicates in the host, causing inclusions in stained cells
  2. Most common reportable STI in the United States—approximately 4 million acquired infections annually (reporting not required in all states)
  3. Chlamydia infection may be the etiology of 50% of pelvic infections
  4. May be transmitted vertically to the neonate in up to 70% of untreated women (conjunctival infection or pneumonia)
5. Sequelae of chlamydia include cervicitis, endometritis, PID, ectopic pregnancy, infertility, acute urethral syndrome, postpartum infections, premature labor and delivery, premature rupture of the membranes, and perinatal morbidity

6. Risk factors
   a. Sexually active women younger than age 25
   b. Multiple partners or partners with multiple sexual partners
   c. Nonuse of barrier methods of contraception

   • Symptoms
     1. May be asymptomatic
     2. Postcoital bleeding; intermenstrual bleeding or spotting
     3. Symptoms of urinary tract infection—dysuria, frequency
     4. Vaginal discharge
     5. Abdominal pain
     6. Males—usually asymptomatic; may have dysuria, urethral discharge, pruritus

   • Physical findings
     1. Mucopurulent endocervical discharge; edematous, tender cervix with easily induced bleeding
     2. Suprapubic pain or slight tenderness upon palpation
     3. Males—mucoid to mucopurulent urethral discharge

   • Differential diagnosis
     1. Gonococcal infection
     2. Urethritis or urinary tract infection
     3. Salpingitis

   • Diagnostic tests/findings
     1. Culture—expensive
       a. Specimen source for women—vaginal preferred (patient or provider collected), endocervix, urine (slightly less sensitive)
       b. Specimen source for men—first-catch urine (preferred)
       c. Other—anatomic site of exposure; rectal, oropharyngeal
     3. Gonococcal (GC) culture or nonculture test to rule out concomitant gonorrhea
     4. Serologic testing for syphilis; wet-mount testing for vaginal infection; consider HIV screen

   • Management/treatment
       a. Azithromycin 1 g orally, single dose
       b. Doxycycline 100 mg orally for seven days
     2. Alternative regimens
       a. Erythromycin base 500 mg orally for seven days
       b. Erythromycin ethylsuccinate 800 mg orally seven days
       c. Ofloxacin 300 mg orally seven days
       d. Levofloxacin 500 mg orally for seven days
     3. Treatment in pregnancy—see Chapter 7
     4. Doxycycline should not be used in pregnancy; may cause discoloration of teeth in children
     5. Erythromycin estolate is contraindicated in pregnancy because of drug-related hepatotoxicity
     6. Quinolones (ofloxacin, levofloxacin) are contraindicated in pregnancy
     7. Sex partners should be evaluated, tested, and treated if they had sexual contact with patient during the 60 days preceding onset of symptoms in the patient or diagnosis of chlamydia
     8. The most recent sex partner should be evaluated and treated even if the time of the last sexual contact was more than 60 days before symptom onset or diagnosis (Centers for Disease Control and Prevention [CDC], 2015)
     9. Consider expedited partner treatment (EPT) if cannot ensure that patient’s sex partner(s) in past 60 days will otherwise receive treatment
       a. EPT entails treatment of sex partner(s) of patient with chlamydia or gonorrhea by providing her with medication or prescription to give to partner without the clinician examining the partner.
       b. Clinician must follow any state regulations or laws regarding EPT (CDC, 2015)
     10. Intercourse should be avoided for seven days after single-dose treatment, or until seven-day regimen is completed
     11. Partner treatment is essential for decreasing risk for reinfection of patient
     12. Retesting for reinfection three months post treatment is recommended
     13. Test of cure
       a. Not recommended if treated with CDC-recommended or alternative regimens and not pregnant
       b. Consider test of cure if suspect noncompliance with treatment or if symptoms persist
       c. Wait at least three weeks after treatment to do test of cure—before three weeks may get false negative

   Condyloma Acuminata, Anogenital Warts
   • Definition—a sexually transmitted, viral disease affecting the vulva, vagina, cervix, penis, and perianal area
   • Etiology/incidence
     1. Caused by human papillomavirus (HPV)
     2. Approximately 100 species of HPV; more than 30 types infect anogenital mucosal surfaces; patient may be infected with multiple types simultaneously; 90% of anogenital warts caused by low risk for malignancy HPV types (6, 11)
     3. Sexually transmitted by skin-to-skin contact through viral shedding; fomite spread is possible but rare
     4. Highly contagious—25–65% of partners will have HPV
     5. Incubation period four to six weeks
     6. The most common viral, sexually transmitted infection in the United States
     7. Risk factors
       a. Previous or current other STI
       b. First intercourse at an early age (<16 years); multiple sexual partners
       c. Partner who has (or has had) multiple partners
       d. Factors that suppress the immune system—diabetes, pregnancy, steroid hormones, folate deficiencies, immunosuppressive diseases

   • Symptoms
     1. Wartlike lesions—pedunculated conical or cauliflower appearance; whitish to pinkish gray; granular, rough texture to skin
2. Lesions may be singular, multiple, or in clusters on perineum, vulva, vagina, cervix, shaft of penis, under the foreskin of the uncircumcised penis, and perianal area
3. Perianal area may bleed easily, and may be painful, odorous, and pruritic
• Physical findings
  1. Wartlike lesions—conical, cauliflower appearance; may be multiple anywhere on perineum, perianal area, vagina, cervix, or penis
  2. May appear granular, macular, or cobblestone
  3. Color varies pink to gray; darkly pigmented—have high suspicion for malignancy
• Differential diagnosis
  1. Verrucous carcinoma
  2. Normal variants of skin tags
  3. Molluscum contagiosum
  4. Condyloma lata
  5. Seborrheic keratosis or other benign skin disorders
• Diagnostic tests/findings
  1. Diagnosis is made by visual inspection
  2. Biopsy if diagnosis uncertain; no response to or worsening during standard therapy; patient immunocompromised; warts darkly pigmented, indurated, bleeding, ulcerated
  3. Serologic testing for syphilis; testing for other STIs; wet-mount testing for vaginal infections; consider HIV testing
• Management/treatment
  1. Goal of treatment is to eliminate present visible disease and improve symptoms
  2. If untreated, may resolve on own, persist, remain unchanged, or increase in size or number
  3. As no treatment has been proven to be better than another, treatment depends on patient preference, availability of resources, and provider experience
  4. Keep area dry and clean
  5. Advise condom use
  6. Physical agents
    a. Cryotherapy with liquid nitrogen; repeat every one to two weeks for six weeks
    b. Excision with tangential shave excision, curettage, electrocautery, or scissors or excision with laser
  7. Provider applied chemical or keratolytic agents
    a. Trichloracetic or bichloracetic acid (80–90% solution); apply small amount carefully to wart, allow to dry; will turn white; apply sodium bicarbonate or talc to neutralize or remove unreacted acid; may reapply weekly; safe in pregnancy
    b. Podophyllin resin (10–25%) in compound tincture of benzo—in—CDC recommends application of small amount to each wart, wash off in one to four hours; repeat weekly up to six weeks; not recommended during pregnancy; contraindicated when breastfeeding
    c. If lesions are not resolved at the end of six weeks of treatment, reevaluate, change treatment, or refer
8. Patient-applied treatment
   a. Imiquimod 3.75% or 5% cream applied sparingly at bedtime three times a week; area washed with mild soap 6 to 10 hours after application; safety in pregnancy is unknown
   b. Podofilox 0.5% gel or solution; applied sparingly to visible warts twice daily for three consecutive days, then withhold use for four consecutive days; repeat weekly cycle up to four times; safety in pregnancy is unknown
   c. Sinecatechins 15% ointment; applied to visible warts three times daily for up to 16 weeks; safety in pregnancy is unknown
d. Use only on external warts
9. Immunotherapy—interferon
10. Combination therapy may be useful, especially in single-treatment failures
11. Refer if treatment fails or if lesions are darkly pigmented, indurated, ulcerated, suspicious, or biopsy positive for HPV type with malignant potential
12. Rule out high-grade squamous intraepithelial lesion (HGSIL) before treating cervical condyloma
13. Emphasize importance of regular Pap test per screening recommendations
14. HPV vaccination of all young girls and women (recommended for ages 11–26 years), boys and young men (recommended for ages 9–26 years)

Gonorrhea
• Definition—a sexually transmitted bacterial infection with an affinity for columnar and transitional epithelium
• Etiology/incidence
  1. Neisseria gonorrhoeae—Gram-negative, intracellular diplococcus requiring carbon dioxide environment to survive
  2. Sites for uncomplicated GC may be urethra, endocervix, Skene's glands, Bartholin's glands, pharynx, and/or anus
  3. Most commonly sexually transmitted; neonate may become infected during birth
4. Incubation period three to five days
5. More than 1 million cases reported annually; may be as many as 2 million
6. Occurs in individuals younger than age 30 approximately 80% of the time
7. Male-to-female transmission estimated at 50–90%; female-to-male transmission 20–25%
8. Since 1976, penicillinase-producing strains have been present—some are now resistant to tetracycline, spectinomycin, or quinolones
9. Sequelae include PID, infertility, ectopic pregnancy, septic arthritis, bacteremia, infections of Bartholin's and Skene's glands, epididymitis, proctitis, perihepatitis, gonorrhea ophthalmia neonatorum in neonates, premature rupture of the membranes, chorioamnionitis, and prematurity
10. Risk factors
   a. Sexually active women younger than age 25
   b. Multiple sexual partners or partners with multiple partners
   c. History of STIs
   d. Inconsistent condom use
   e. Commercial sex work
   f. Illicit drug use
• Symptoms
  1. May be asymptomatic
  2. Females—vaginal discharge; postcoital bleeding; dysuria; vulvar pain with Bartholin’s or Skene’s gland infections; pelvic pain with PID
  3. Males—penile discharge; dysuria; severe testicular/scrotal pain and swelling with epididymitis
  4. Anal bleeding—proctitis
  5. Joint pain; erythema and inflammation of joints—septic arthritis, bacteremia
• Physical findings
  1. Mucopurulent endocervical or penile discharge; inflamed Skene’s or Bartholin’s glands; easily induced bleeding of cervix
  2. Twenty percent invade uterus after menses, with signs of endometritis, salpingitis, or pelvic peritonitis
  3. Epididymitis—most common causes in young men are gonorrhea and chlamydia; low-grade fever; red, swollen, extremely tender scrotum; enlarged, tender epididymis
  4. Signs associated with infection at other sites or septic arthritis
• Differential diagnosis
  1. Nongonococcal mucopurulent cervicitis (MPC)
  2. Chlamydia
  3. Vaginitis
  4. Males—nongonococcal urethritis (NGU); torsion of spermatic cord
• Diagnostic tests/findings
  1. Gram stain of penile discharge; no value in women (60–70% false negative)
  2. Culture on Thayer-Martin medium—allows for susceptibility testing if suspect treatment failure
  4. Serologic testing for syphilis; chlamydia testing; consider HIV screen
• Management/treatment
  1. CDC recommendations for uncomplicated infections of cervix, urethra, and rectum
    a. Ceftriaxone 250 mg intramuscularly AND either azithromycin 1 g orally as a single dose or doxycycline 100 mg orally twice daily for seven days (CDC, 2015)
    b. A coinfection with C. trachomatis is frequently found with N. gonorrhoeae. Recommendation by CDC is for patients to be treated routinely for uncomplicated genital C. trachomatis infection when treating for N. gonorrhoeae
    c. Dual therapy also recommended because of growing concern about antibiotic resistance
  2. Treatment in pregnancy—see Chapter 7
  3. Key points
    a. A test of cure is not needed if uncomplicated gonorrhea was treated with the recommended regimen
    b. Avoid sexual intercourse until all partners are treated and no longer have symptoms
    c. Patient’s sexual partner or partners within 60 days before onset of symptoms or diagnosis of infection should be evaluated and treated
d. Consider EPT if cannot ensure that patient’s sex partner(s) in past 60 days will otherwise receive treatment
e. If the patient’s last sexual encounter was > 60 days, treatment for the patient’s most recent sexual partner is recommended
f. Retesting three months after treatment is recommended to detect reinfection

Herpes Simplex (Genital Herpes Simplex, HSV)
• Definition—a common, incurable, chronic, recurrent viral disease
• Etiology/incidence
  1. Causative organism—two serotypes of the herpes simplex virus
    a. Type I (HSV-1) commonly found in the mouth; accounts for 15% of genital infections
    b. Type II (HSV-2) causes 85% of genital infections
  2. Approximately 50 million people infected; 1 million new cases each year
  3. Eighty to 90% of people with HSV-2 infection report no history of signs/symptoms
• Asymptomatic shedding of virus accounts for the majority of reinfection
  4. Usually transmitted by skin-to-skin contact; rarely spread by fomite transmission
  5. Eighty to 90% chance female will develop herpes following sexual contact with an infected male
• Risk factors
  a. Previous or present infection with an STI
  b. Trauma to skin (port of entry of virus)
  c. Immunosuppressed individual
  d. Multiple sexual partners
• Complications
  a. Herpes encephalitis
  b. Herpes meningitis
  c. Diffuse infection in immunocompromised individuals
  d. Perinatal infection
• Genital herpes and pregnancy
  a. Most women with infected neonates have no known history of HSV
  b. Infection is transmitted during labor and delivery
• Symptoms—three HSV syndromes (primary infection, nonprimary first-episode infection, and recurrent infection)
  1. Primary infection
    a. Systemic symptoms—two-thirds have systemic symptoms; fever, malaise, headache; symptoms usually begin within one week of exposure, peak within four days and subside over the next week
    b. Localized genital pain
    c. Course of genital lesions
      1. Local prodrome; pruritus, erythema about one to two days before appearance of lesions
      2. Formation of small, painful vesicles over labia majora, minora, mons pubis, vagina; penis; perianal area (4 to 10 days)
      3. Vesicles rupture, forming shallow, painful, wet ulcerations lasting one to two weeks
      4. Lesions heal without scarring
d. Tender inguinal lymphadenopathy may be the last symptom to resolve

e. Seventy-five percent of women have a vaginal discharge

f. Ninety percent of woman have cervical involvement characterized by vesiculation and tendency to bleed easily

2. Nonprimary first-episode—initial clinical episode in patients with previously circulating antibodies to HSV-1 or HSV-2

a. Symptoms same as primary

b. Few constitutional symptoms

c. Shorter, milder course

3. Recurrent genital herpes infection

a. Symptoms same as primary—usually milder

b. Usually no constitutional symptoms

c. Shorter duration of symptoms (resolve 7 to 10 days)

(1) Prodrome—one to two days

(2) Vesicles—three to five days

(3) Dry-out days—two to three days

• Physical findings

  1. Small, painful vesicles and ulceration at varying stages of progression

  2. Exquisite pain at site of lesion

  3. Inguinal lymphadenopathy

• Diagnostic tests/findings

  1. HSV culture collected from the base of the vesicle or ulcer (may have low sensitivity depending on stage of lesion)

  2. Pap test—low sensitivity, high specificity

  3. Nonculture methods—PCR assay for HSV DNA; most sensitive test for HSV-1 and HSV-2 antibodies; low sensitivity for HSV-1; HSV-2 sensitivity 91–100%, specificity 92–98% at 6 to 12 weeks after initial infection

  4. Type-specific serologic tests (TSSTs) are available to identify HSV-1 and HSV-2 antibodies; low sensitivity for HSV-1; HSV-2 sensitivity 91–100%, specificity 92–98% at 6 to 12 weeks after initial infection

  5. Serologic testing for syphilis; tests for other STIs; consider HIV testing

• Management/treatment

  1. HSV-1 and HSV-2 have no cure; systemic antiviral drugs partially control symptoms; do not eradicate the latent virus nor affect the risk, recurrence, frequency, or severity of the symptoms once drug is discontinued; suppressive therapy may reduce viral shedding

  2. Medical management

a. First clinical episode

  (1) Acyclovir 400 mg orally three times a day or 200 mg orally five times a day for 7 to 10 days

  (2) Famiclovir 250 mg orally three times a day for 7 to 10 days

  (3) Valacyclovir 1 g orally twice a day for 7 to 10 days

b. Episodic treatment for recurrent genital herpes initiate within one day of lesion onset or during prodrome

  (1) Acyclovir 400 mg orally three times a day or 200 mg orally twice a day for five days

  (2) Acyclovir 800 mg orally three times a day for two days

  (3) Famiclovir 125 mg orally twice a day for five days

  (4) Famiclovir 1,000 mg orally twice a day for one day

  (5) Famiclovir 500 mg once, followed by 250 mg twice a day for two days

(6) Valacyclovir 500 mg orally twice a day for three days

(7) Valacyclovir 1 g orally once a day for five days

• Special considerations

  (1) Asymptomatic—counsel; encourage self-examination; encourage use of condoms

  (2) Symptomatic—use same treatment regimen

  (3) Severe infection—hospitalize for IV acyclovir therapy

3. Nonpharmacologic symptom relief

  a. Cool, topical compresses with Burow's solution as needed; reduces swelling and inflammation

  b. Local hygiene; topical anesthetics; cool air with fan or hair dryer

Molluscum Contagiosum

• Definition—a mildly contagious viral epithelium proliferation of the skin

• Etiology/incidence

  1. Caused by the virus *Molluscum contagiosum*, an unassigned pox virus containing double-stranded DNA

  2. Occurs worldwide—more common in tropical and subtropical regions

  3. Most common in children and young adults

  4. Transmitted by skin to skin, fomite, and autoinoculation

  5. Incubation period two to seven weeks

• Symptoms

  1. Flesh-colored, white, or pink, waxy, smooth, firm, spherical papules; umbilicated apex contains central plug; usually less than 20 lesions ranging from pinhead size to 2–5 millimeters in diameter

  2. Presents on trunk and lower extremities in children

  3. Presents on lower abdominal wall, inner thigh, pubic area, genitalia in adults

  4. Usually asymptomatic; may have pain, pruritus, and inflammation

• Physical findings

  1. Lesions are multiple but usually number less than 20

  2. Characteristic light-colored papules with an umbilicated center

  3. Lesions found on face, neck, trunk, lower extremities, abdomen, inner thigh, genital area
• Differential diagnosis
  1. Varicella
  2. Lichen planus
  3. Warts/condyloma
  4. Keratoacanthomas
  5. Subepidermal fibrosis
  6. Epidermal cysts

• Diagnostic tests/finding:
  1. Biopsy usually not indicated—cytoplasmic inclusions; molluscum bodies
  2. Test for other STIs in young adults

• Management/treatment:
  1. Usually resolve spontaneously without scarring
  2. Superficial incision; express contents with comedo extractor
  3. Curettage with cautery
  4. For multiple lesions, cryotherapy with liquid nitrogen, silver nitrate
  5. Treatment may cause scarring

Syphilis

• Definition—a chronic, infectious, sexually transmitted process that progresses predictably through distinct stages

• Etiology/incidence:
  1. Caused by Treponema pallidum
  2. Organism enters skin through microscopic breaks in the skin during sexual contact
  3. Incubation period 10 to 90 days, average 21 days
  4. Occurs worldwide, primarily involving adults 20 to 35 years of age; has become epidemic in the United States; includes syphilis in pregnancy and congenital syphilis
  5. Increased incidence associated with greater use of illicit drugs and high-risk behavior associated with drug use
  6. Racial differences in incidence are associated with social factors; higher incidence in urban areas
  7. Approximately 90,000 cases annually in the United States

• Symptoms:
  1. Four stages of syphilis
     a. Primary
        (1) May be asymptomatic
        (2) Primary lesion (chancre) arises at the point of entry—evident 10 to 90 days following contact
        (3) Painless, ulcerated lesion with raised border and indurated base, rolled edges—spontaneously disappears in three to six weeks
        (4) May appear anywhere the organism enters; genitals, mouth, or anus
        (5) Painless lymphadenopathy may occur
     b. Secondary
        (1) Follows resolution of the primary stage; symptoms become systemic
        (2) Localized or diffuse mucocutaneous lesions (palms, soles, mucous patches, and condylomata lata) with generalized lymphadenopathy along with flu-like symptoms (low-grade fever, headache, sore throat, malaise, arthralgias)
        (3) May begin four to six weeks after appearance of primary lesion and resolve in one week to two months
  c. Latent
     (1) Begins after spontaneous resolution of secondary stage
     (2) No clinical manifestation
     (3) Detected by serologic testing
     (4) If no treatment, patient goes into latent phase (asymptomatic)
     (5) Early latent phase—within one year of acquiring disease
     (6) Late latent phase—after one-year duration
     (7) Late latent phase of unknown duration
     (8) May remain in this stage or progress to tertiary stage
     d. Tertiary
        (1) Characterized by gummas (nodular lesions) involving skin, mucous membranes, skeletal system, and viscera
        (2) Cardiac symptoms, aortitis, aneurysm, or aortic regurgitation
        (3) Neurosyphilis may present without symptoms or with nerve dysfunction, acute or chronic meningitis, stroke, tabs dorsalis, meningo-vascular syphilis, general paralysis, insanity, iritis, chorioretinitis, and leukoplakia
        (4) Not infectious

• Physical findings:
  1. Chancre on vulva, vagina, cervix, penis, or at site of entry of organism—begins primary stage
  2. Secondary stage manifestations may be generalized maculopapular rash, mucocutaneous lesion, adenopathy
  3. Condyloma lata—wartlike lesions on vulva, penis, perianal region, and upper thighs
  4. Tertiary may be manifested by multiple organ involvement
  5. Gummas—tertiary manifestation; appear as nodules that enlarge, ulcerate, and become necrotic

• Differential diagnosis:
  1. Other genitoulcerative diseases; herpes, chancroid, lymphogranuloma venereum, granuloma inguinale
  2. Genital carcinoma
  3. Trauma

• Diagnostic tests/finding:
  1. Dark field microscopy of fluid from lesions reveals Treponema
  2. Serologic testing
     a. Nontreponemal—Venereal Disease Research Laboratory (VDRL); rapid plasma reagin (RPR); 80–90% accurate in making a diagnosis; nonspecific
     b. Treponemal—fluorescent treponemal antibody absorption test (FTA-ABS); T. pallidum particle agglutination (TP-PA); specific
     c. A positive RPR or VDRL must be confirmed with a FTA-ABS or TP-PA
     d. Although not common (1%), false positives may occur; more likely with nontreponemal tests; causes may include autoimmune disease, Lyme disease, pregnancy, recent immunization, substance abuse
e. Treponemal tests tend to remain positive for lifetime regardless of treatment for syphilis
f. Nontreponemal test titers usually correlate with disease activity, and results should be reported quantitatively; a fourfold change in titer is equal to two dilutions (e.g., 1:16 to 1:4 or 1:8 to 1:32)

3. Lumbar puncture for testing of cerebrospinal fluid to detect neurosyphilis—late latent or tertiary stage
4. Tests for other STIs including HIV

• Management/treatment

1. Who must be treated
   a. Pregnant women
   b. Individuals with positive dark-field examination or positive treponemal antibody test
   c. People treated previously who have a fourfold rise in quantitative nontreponemal test
   d. Patients with uncertain diagnosis
   e. Persons who were exposed within 90 days preceding the diagnosis of primary, secondary, or early latent syphilis in a sexual partner—treat presumptively even if seronegative
   f. Persons who were exposed more than 90 days before the diagnosis of any stage of syphilis in a sexual partner—treat presumptively if test results not immediately available and opportunity for follow-up is uncertain

2. Treatment (CDC, 2015)
   a. Primary or secondary
      (1) Benzathine penicillin G 2.4 million IM in a single dose
      (2) Doxycycline 100 mg orally bid for two weeks or tetracycline 500 mg orally qid for two weeks, for nonpregnant penicillin allergic
   b. Latent
      (1) Early latent—benzathine penicillin G 50,000 units/kg IM, up to the adult dose of 2.4 million units in a single dose
      (2) Late latent or latent of unknown duration—benzathine penicillin G 50,000 units/kg IM, up to the adult dose of 2.4 million units given IM as three doses at one-week intervals (total 150,000 units/kg up to the adult dose of 7.2 million units)
   c. Treatment in pregnancy—see Chapter 7
   d. HIV-positive individuals
      (1) May have a higher incidence of neurologic involvement and higher rate of treatment failure—careful follow-up is important
      (2) Serologic test results may be atypical
      (3) When clinical picture is positive and serologic test is negative, biopsy, dark-field, or direct fluorescent antibody staining is done

3. Follow-up
   a. Quantitative nontreponemal serologic tests are repeated at 6, 12, and 24 months
   b. Titers should decline at least fourfold within 12 to 24 months
   c. A fourfold increase indicates inadequate treatment or a new infection
   d. Pregnant women without a fourfold drop in titer in a three-month period need repeat treatment
   e. Treponemal tests remain positive for lifetime in most individuals regardless of treatment or disease activity
   f. Report all cases to proper agency for follow-up of sexual contacts

Chancroid

• Definition—an acute, contagious, ulcerative, bacterial infection that is sexually transmitted

• Etiology/incidence
  1. Haemophilus ducreyi is a short, nonmotile, gram-negative rod (anaerobe) that grows in chains known as school-of-fish pattern
  2. Incubation period four to five days
  3. Occurs only in a few areas of the United States in discrete outbreaks; associated with drug use, commercial sex, and acquisition of infection outside the United States
  4. Most often seen in tropical and subtropical climates, in regions of Africa and the Caribbean
  5. Increases risk for both acquisition and transmission of HIV

• Symptoms
  1. May be asymptomatic
  2. Papules or painful ulcerations on labia, anogenital skin, vagina, cervix in women; around the prepuce, around the frenulum, on coronal sulcus in men
  3. May be foul odor
  4. One week after onset, bilateral, tender, suppurant inguinal lymphadenopathy (bubo) develops (30–60%)
  5. Lesions resolve in one to two weeks if treated; one to three months if untreated

• Physical findings
  1. Deep ulcerations with irregular, scalloped borders
  2. Bilateral, tender, suppurant inguinal lymphadenopathy
  3. Lesions found on labia, vagina, anogenital skin, penis, and cervix
  4. May have foul odor

• Differential diagnosis
  1. Genital herpes
  2. Syphilis
  3. Malignancy of vulva or penis
  4. Trauma
  5. Donovanosis

• Diagnostic tests/findings
  1. Gram stain reveals gram-negative rods or chains
  2. Definitive test is culture to identify H. ducreyi—collect from lesion or bubo; difficult to isolate on culture; use specific medium (sensitivity < 80%)
  3. Clinical signs pathognomonic
     a. Genital ulcers with typical characteristics
     b. Regional lymphadenopathy
     c. Negative test for HSV
     d. Suppurant inguinal adenopathy
  4. Serologic testing for syphilis and HIV

• Management/treatment
  1. Cured with treatment; may leave scarring in severe cases
  2. CDC (2015) recommendations
     a. Azithromycin 1 g orally in a single dose
     b. Ceftriaxone 250 mg IM in a single dose
b. Erythromycin base 500 mg orally four times a day for 21 days
2. Follow-up—follow clinically until signs and symptoms have resolved
3. Management of sexual partner
   a. Examine and test those who had sexual contact with the patient during the 60 days before onset of symptoms and treat with a chlamydia regimen (azithromycin 1 g orally single dose or doxycycline 100 mg orally twice a day for seven days)
   b. Evaluate for other STIs

Pelvic Inflammatory Disease (PID)

- Definition—comprises a spectrum of inflammatory disorders of the upper female genital tract, including any combination of salpingitis, endometritis, tubo-ovarian abscess, and pelvic peritonitis
- Etiology/incidence
  1. Causative organisms include *Chlamydia trachomatis*, *Neisseria gonorrhea*, polymicrobial infection (*Escherichia coli*, *G. vaginalis*, *Haemophilus influenzae*, *Mycoplasma hominis*)
  2. One million cases are diagnosed annually
  3. Two hundred thousand hospitalizations at a cost of $5 billion
  4. Twenty-five percent of cases result in infertility, ectopic pregnancy, or chronic pelvic pain
  5. One-third of women with gonorrhea or chlamydia cervicitis progress to PID if not treated
  6. Teenagers account for one-fifth of total cases
  7. Risk factors
     a. Sexually active females younger than 20 years
     b. Multiple sexual partners
     c. Previous episode of PID
     d. Presence of chlamydia, gonorrhea, and/or bacterial vaginosis
     e. Vaginal douching
- Symptoms
  1. May be acute or mild
  2. Abdominal pain
  3. Vaginal discharge
  4. Fever
  5. Dysuria
  6. Dyspareunia
  7. Nausea/vomiting
  8. Vaginal spotting or bleeding (30%)
- Physical findings
  1. Minimum criterion for empiric treatment of PID in sexually active young women and other women at risk for STIs with complaint of pelvic or lower abdominal pain is presence of one or more of these three findings on pelvic examination
     a. Cervical motion tenderness
     b. Uterine tenderness
     c. Adnexal tenderness
  2. Additional criteria that enhance specificity of the minimum criterion and support PID diagnosis
     a. Fever of more than 101°F (> 38.4°C) orally
Urinary Tract Disorders

Urinary Tract Infections (UTIs)

- Definition—a term that encompasses a broad range of infections affecting the urinary tract
  1. Cystitis— infection of the bladder
  2. Urethritis— infection of the distal urethra
  3. Acute pyelonephritis— infection of the kidney

- Etiology/incidence
  1. *Escherichia coli* most common organism (80%) in cystitis, also *Staphylococcus saprophyticus* (15%), *Proteus mirabilis*, *Klebsiella pneumoniae* (all reside in the GI tract)
  2. Colonization of bacteria in the vagina due to alterations in pH increase the risk of bladder colonization
  3. Cystitis is more common in women than in men; 1 in 5 women will develop cystitis in lifetime
  4. Urethritis is more common in men than women; associated with *chlamydia*, *gonorrhea*, and *Mycoplasma genitalium*
  5. There are four major pathways of infection
    a. Ascending from urethra (> 90%)
    b. Hematogenous
    c. Lymphatic
    d. Direct extension from another organ
  6. Risk factors
    a. Neurologic disease
    b. Renal failure
    c. Diabetes
    d. Anatomic abnormalities
    e. Pregnancy
    f. Kidney stones
    g. Instrumentation/catheterization
    h. Infrequent voiding
    i. Diaphragm, tampon, and spermicide use
    j. Sexual activity—coital frequency, new sexual partner
    k. Immunosuppression
    l. Sickle cell disease or trait
    m. Douching
    n. Estrogen deficiency

- Differential diagnosis
  1. Ectopic pregnancy
  2. Appendicitis
  3. Ruptured ovarian cyst
  4. Torsion of adnexal mass
  5. Ulcerative colitis
  6. Degenerative leiomyoma
  7. Renal calculus

- Diagnostic tests/findings
  1. Chlamydia and gonorrhea tests
  2. ESR and/or C-reactive protein—elevated
  3. Criteria for definitive diagnosis (in case of unsure diagnosis or poor response to treatment)
    a. Histologic evidence of endometritis on endometrial biopsy
    b. Sonography or other radiographic tests revealing tubo-ovarian abscess
    c. Laparoscopy— abnormalities consistent with PID

- Management/treatment
  1. Regimen A— ceftriaxone 250 mg IM once plus doxycycline 100 mg orally bid for 14 days, with or without metronidazole 500 mg orally bid for 14 days
  2. Regimen B— cefoxitin 2 g IM once with probenecid 1 g orally administered concurrently in a single dose plus doxycycline 100 mg orally bid for 14 days, with or without metronidazole 500 mg orally twice a day for 14 days
  3. Regimen C— other third-generation cephalosporin IM once plus doxycycline orally bid for 14 days, with or without metronidazole orally bid for 14 days
  4. Criteria for hospitalization
    a. Patient is pregnant
    b. Pelvic abscess is suspected
    c. When surgical emergency cannot be ruled out (ectopic pregnancy, appendicitis)
    d. Severe illness, high fever, nausea, and vomiting
    e. Failure of outpatient therapy
  5. Follow-up, reexamine within 72 hours
    a. If not significantly improved, review diagnosis and treatment, patient may need hospitalization
    b. Criteria for improvement—abatement of fever, reduction in direct or rebound abdominal tenderness; reduction in adnexal, uterine, and cervical motion tenderness
    c. Counsel on safer sexual practices
  6. Partner treatment— evaluate, test, and treat presumptively for gonorrhea and chlamydia if contact occurred with patient during the 60 days before onset of symptoms

- Symptoms
  1. Range from mild to severe
    a. Acute cystitis
      1. Abrupt onset
      2. Dysuria
      3. Frequency of urination
      4. Urgency of urination
      5. Suprapubic pain
      6. Nocturia
      7. Painful bladder spasms
      8. Cloudy, malodorous urine
      9. Hematuria (gross)
b. Pyelonephritis
   (1) Chills, fever
   (2) Dysuria
   (3) Frequency of urination
   (4) Urgency of urination
   (5) Cloudy malodorous urine
   (6) Hematuria (gross)
   (7) Nausea, vomiting
   c. Urethritis
      (1) Dysuria
      (2) Frequency of urination
      (3) Urethral pruritus
      (4) Mucopurulent penile or vaginal discharge

- Physical findings
  1. Cystitis—may have suprapubic tenderness
  2. Pyelonephritis
     a. Unilateral or bilateral costovertebral angle tenderness
     b. Fever
     c. Flank or abdominal pain
     d. Vomiting
  3. Urethritis—erythema, mucopurulent penile or vaginal discharge

- Differential diagnosis
  1. Vaginitis
  2. Sexually transmitted infection
  3. Pelvic inflammatory disease
  4. Interstitial cystitis
  5. Urinary tract obstruction
  6. Urinary tract malignancy

- Diagnostic tests/findings
  1. Urine microscopy on clean catch—more than five WBCs per high-powered field (HPF) and the presence of bacteria with few squamous cells
  2. Urine culture and sensitivity
     a. Traditional criterion for infection—a colony count of more than 100,000 organisms per milliliter
     b. As few as 10,000 organisms per milliliter have been known to produce symptoms
     c. Evaluated for sensitivity to medications
  3. Enzymatic (dipstick) testing—less reliable (75% sensitivity)
     a. Indicates hematuria; nitrites indicate presence of bacteria; leukocyte esterase indicates presence of WBCs
     b. Send urine for urinalysis and/or culture and sensitivity if dipstick is negative in symptomatic woman and other cause of symptoms is not apparent
  4. Test for vaginitis, and STIs if indicated

- Management/treatment
  1. Uncomplicated UTI
     a. Initial treatment of a symptomatic uncomplicated UTI can be based on urinalysis or dipstick testing without urine culture
     b. If culture is done, may start treatment before results are available
     c. Use three-day regimens—single-dose treatment is less effective
     d. Suggested first-line medical regimens for nonpregnant women:
        (1) Nitrofurantoin orally
        (2) Trimethoprim-sulfamethoxazole (TMP/SMX) orally
        (3) Fosfomycin orally
  2. Recurrent UTI—approximately 25% of women have a recurrent UTI with most occurring within two to three months
     a. Retest and retreat
     b. Use same medications as for uncomplicated UTI but for seven days
     c. Review potential lifestyle risk factors that can be reduced or eliminated
     d. Consider 6 to 12 months’ prophylaxis regimen if two infections in past six months or three infections in prior 12 months—recommended antibiotics include TMP/SMX, trimethoprim, nitrofurantoin, cefaclor, cephalaxin
     e. If related to coitus, consider single-dose antibiotic regimen after sex—recommended antibiotics include TMP/SMX, nitrofurantoin, cephalaxin, norfloxacin, ofloxacin
     f. Consider vaginal estrogen for postmenopausal woman with vaginal atrophy/genitourinary syndrome of menopause
  3. Pyelonephritis—use same medications as for uncomplicated UTI but 10 to 14 days; test of cure two to four weeks after treatment complete
  4. Prevention/prophylaxis
     a. Void after intercourse
     b. Discontinue use of spermicides and diaphragm
     c. Intravaginal/topical estrogen in women with atrophy of genitalia
     d. Avoid delay in emptying bladder
  5. Referral
     a. Patients with possible pyelonephritis or a history of pyelonephritis with UTI symptoms
     b. Patients with three or more episodes of cystitis in one year with the same causative organism
     c. Suspected renal calculus, urinary tract obstruction, urinary tract malignancy

Urinary Incontinence (UI)

- Definition—involuntary loss of urine
  1. Stress incontinence (SUI)—leakage of urine during events that result in increased abdominal pressure, such as sneezing, coughing, physical exercise
  2. Urge incontinence (UUI)—involuntary leakage of urine accompanied by or immediately preceding an urgency
  3. Mixed incontinence—combination of SUI and UUI symptoms
  4. Overactive bladder (OAB)—sense of urgency with or without incontinence; may be accompanied by frequency and nocturia

- Etiology/incidence
  1. SUI—inadequate pelvic floor support or weak tone of sphincter between bladder and urethra
  2. UUI and OAB—overactivity of detrusor muscle, causing inappropriate contraction during bladder filling
  3. Risk factors
     a. Advancing age
     b. Childbearing (vaginal birth more than cesarean)
     c. Family history in first-degree relative
     d. Hysterectomy
     e. Pelvic organ prolapse
f. Obesity, chronic cough, straining from constipation—increased abdominal pressure
g. Cognitive impairment, restricted mobility, neurologic disability, stroke, diabetes
h. Medications (e.g., diuretics, anticholinergics, alpha adrenergics, alpha antagonists, sedatives)
4. Ten to 25% of women between 15 and 64 years suffer from incontinence
5. Fifty percent of nursing home population experience incontinence
6. Fewer than 50% of individuals seek help; most are silent sufferers
• Symptoms
  1. SUI
     a. Loss of urine, usually in small amounts, with coughing, laughing, sneezing
     b. Vaginal dryness if atrophy present
  2. UUI
     a. Involuntary loss of urine preceded by a sudden, strong urge to urinate
     b. Usually voids large amounts
     c. Difficulty in controlling once flow begins
     d. Occurs without warning—cold weather, physical activity, laughing, sexual intercourse, or placing a key in a door lock
  3. OAB—frequency, urgency, nocturia
  4. Mixed urinary incontinence—presents with both symptoms of stress and urge incontinence
• Physical findings
  1. Urinary leakage with increased abdominal pressure
  2. Relaxed pelvic floor muscles—pelvic organ prolapse
  3. Vaginal atrophy, perineal irritation
• Differential diagnosis
  1. Urinary tract infection
  2. Prolapse of bladder
  3. Tumor compressing bladder
  4. Vaginal atrophy
  5. Stool impaction
• Diagnostic tests/findings
  1. Review prescription and nonprescription drugs for etiologic factors
  2. Voids diary
  3. Urinary stress test to assess loss of urine when coughing and straining
  4. Postvoid residual measurement using catheter or scan
  5. Urinalysis/culture to evaluate for infection
  6. Urodynamic testing if etiology of incontinence is unclear after a basic office evaluation
• Management/treatment
  1. Transient incontinence can usually be treated with identification and treatment of underlying medical problems, and with behavior therapy such as habit training and timed voiding
  2. SUI—pelvic muscle exercises/pelvic floor training with Kegel exercises and biofeedback, weight loss if obese, treatment for constipation, smoking cessation, pessaries
  3. UUI/OAB—bladder retraining with scheduled voiding, biofeedback, Kegel exercises, avoiding bladder irritants, anticholinergic and antimuscarinic agents (oxybutynin chloride, tolterodine tartrate)
  4. Mixed incontinence—combine measures for urge and stress incontinence
  5. Surgery decisions based on type and severity of symptoms, lack of response to conservative therapy, or preferring not to use conservative therapy
  6. Referral to a urogynecologist

**Interstitial Cystitis (IC)/Painful Bladder Syndrome**
- Definition—unpleasant sensation (pain, pressure, discomfort) perceived to be related to urinary bladder, associated with lower urinary tract symptoms, greater than six weeks’ duration, absence of infection
- Etiology/incidence
  1. Etiology unknown—possible causes:
     a. Defect in bladder epithelium that allows irritating substances in urine to penetrate into bladder wall
     b. Autoimmune condition targeting bladder
     c. Allergic reaction—mast cells releasing histamine
     d. Neural hypersensitivity
     e. Associated with other chronic pain conditions, for example, irritable bowel syndrome, fibromyalgia, vulvodynia
  2. Incidence—estimated 3 million U.S. women over 18 years old; only about 10% diagnosed
- Symptoms
  1. Urinary frequency and urgency
  2. Suprapubic pain/pressure/discomfort related to bladder filling—may void to avoid or relieve pain
  3. Increased pain with ingestion of specific foods or beverages
  4. Nocturia
  5. Dyspareunia
- Physical findings
  1. Suprapubic tenderness
  2. Anterior vaginal wall/urethra tenderness
  3. Perineal tenderness
- Differential diagnoses
  1. UTI
  2. Chlamydia
  3. PID
  4. OAB
- Diagnostic test/findings
  1. Frequency/volume diary—include notation of bladder irritants
  2. Symptom questionnaire
  3. Urinalysis and urine culture—evaluate for infection or hematuria
  4. Cytology if hematuria or history of tobacco use
  5. Cystoscopy, urodynamic testing if diagnosis unclear
- Management/treatment
  1. Lifestyle and behavioral changes to relieve symptoms
  2. Physical therapy to release muscle contractures and trigger points
  3. Bladder retraining to increase time interval between voiding
  4. Oral medications—anti-inflammatory drugs; amitryptiline; cimetidine; hydroxyzine; pentosane polysulfate sodium (may take several months for relief, mechanism of action unknown)
5. Bladder instillation medications—dimethyl sulfoxide (DMSO), heparin, lidocaine
6. Hydrodistention with cystoscopy under anesthesia

### Vulvar Conditions

#### Vulvar Dermatoses

- **Definition**—non-neoplastic disorders of vulvar epithelium producing a number of visible changes as well as pain/pruritus that may be severe; three major vulvar dermatoses: lichen sclerosus, lichen planus, lichen simplex chronicus

- **Etiology/incidence**
  1. Lichen sclerosus—chronic, progressive inflammatory skin condition primarily affecting the perineal and perianal areas, most common in postmenopausal women; multifactorial: genetic, familial disposition, autoimmune
  2. Lichen planus—inflammatory skin condition manifested in the vulva, vagina, and other mucous membranes; typically seen in peri- and postmenopausal women; flares and remits spontaneously; lasts from several weeks to years; thought to be autoimmune
  3. Lichen simplex chronicus—thickening of skin in response to chronic rubbing or scratching; may be atopic reaction; sometimes reaction to chronic inflammation from underlying skin condition
  4. Associated autoimmune disorders may be seen with lichen sclerosus and lichen planus—vitiligo, thyroid disorder, alopecia areata, ulcerative colitis, other

- **Symptoms and physical findings (Table 6-2)**

- **Differential diagnosis**
  1. Vitiligo
  2. Vulvar carcinoma
  3. Seborrheic dermatitis
  4. Psoriasis
  5. Tinea
  6. Vaginitis
  7. Sexually transmitted infection
  8. Parasitic infection

- **Diagnostic tests/findings**
  1. Biopsy—confirm diagnosis
  2. Saline and KOH wet mount to rule out vaginitis
  3. STI testing if indicated

- **Management/treatment**
  1. Remove all contact irritants
  2. Skin emollients—vegetable-based oils
  3. Skin protectants—A&D ointment, zinc oxide
  4. Baking soda or Domeboro soaks
  5. Treat any underlying infections
  6. High-potency topical corticosteroids, ointment base best for vulva instead of cream; taper as symptoms improve and may continue for maintenance
  7. Oral or injected corticosteroids may be needed with lichen planus
  8. Vaginal dilators if needed to maintain vaginal patency
  9. Referral to dermatologist for severe symptoms, no relief with treatment, or unsure diagnosis
  10. Long-term/chronic conditions; counseling may be beneficial
  11. Increased risk for vulvar squamous cell carcinoma (4–5%) with lichen sclerosus—yearly vulvar exam with biopsies as needed

### Vulvodynia

- **Definition**—chronic vulvar discomfort, often described as burning pain, occurring in absence of relevant physical findings or a specific clinically identifiable neurologic disorder; may be generalized or localized to vestibule
  1. Generalized vulvodynia—may involve mons pubis, labia majora, labia minor, perineum
  2. Localized vulvodynia (vestibulodynia)—pain localized to vestibule and clitoris

- **Etiology/incidence**
  1. Multifactorial—altered immune inflammatory process, chronic inflammation, neurologic dysfunction (heightened sensitivity, nerve fiber proliferation)
  2. Incidence—8–16% of women
  3. Commonly associated conditions are irritable bowel syndrome, interstitial cystitis/painful bladder syndrome, fibromyalgia

#### Table 6-2 Symptoms and Physical Findings of Vulvar Dermatoses

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Lichen Sclerosus</th>
<th>Lichen Planus</th>
<th>Lichen Simplex Chronicus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pruritus</td>
<td>Pruritus, burning, raw sensation</td>
<td>Pruritus, burning, raw sensation</td>
<td>Pruritus</td>
</tr>
<tr>
<td>Dyspareunia</td>
<td>Vaginal discharge/ bleeding</td>
<td>Vaginal discharge/ bleeding</td>
<td>Chronic itch–scratch cycle</td>
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<tr>
<td>Dysuria</td>
<td>Dyshpareunia</td>
<td>Dyshpareunia</td>
<td>Dyshpareunia</td>
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<tr>
<td></td>
<td>Loss of vulvar architecture with obliteration of the clitoris</td>
<td>Loss of vulvar architecture with obliteration of the clitoris</td>
<td>May involve other mucosal tissues</td>
</tr>
<tr>
<td>Physical findings</td>
<td>Maculopapular lesions, plaques</td>
<td>Sharply demarcated, shiny, erythematosus papules/patches</td>
<td>Thickened, leathery plaques on labia majora</td>
</tr>
<tr>
<td></td>
<td>Loss of pigmentation</td>
<td>Gray-white lace strands of hyperkeratosi overlay patches</td>
<td>Excoriations and erosions from scratching</td>
</tr>
<tr>
<td></td>
<td>Markedly thin, white epidermis</td>
<td>Vaginal erythema, erosions, adhesions</td>
<td>May involve other body areas—nape of neck, ankle, forearm, antecubital and popliteal fossae, scalp</td>
</tr>
<tr>
<td></td>
<td>Symmetry of distribution extends around anal region (figure of eight)</td>
<td>Loss of vulvovaginal architecture</td>
<td></td>
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<tr>
<td></td>
<td>Loss of vulvar architecture with obliteration of the clitoris</td>
<td>May involve other mucosal tissues</td>
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<td></td>
<td>Introital stenosis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Additional Gynecologic Disorders

Chronic Pelvic Pain

- Definition—noncyclic pain that lasts longer than six months, localized to pelvic/lower abdominal/lumbosacral region, and of sufficient severity to cause functional disability and/or leads individual to seek medical care

- Etiology/incidence
  1. Gynecologic, musculoskeletal, gastrointestinal, urologic, neurologic, and psychosomatic origin
  2. Relationship between pelvic pain and the underlying gynecologic pathology is often inexplicable

- Gynecologic causes
  a. Endometriosis
  b. Post-PID chronic pain
  c. Adhesions
  d. Pelvic varicosity pain syndrome/pelvic congestion syndrome
  e. Ovarian mass
  f. Uterine fibroids
  g. Adenomyosis
  h. Vulvodynia
  i. Gynecologic malignancies (especially late stage)

- Nongynecologic causes
  a. Painful bladder syndrome/interstitial cystitis
  b. Myofascial pain syndrome
  c. Irritable bowel syndrome
  d. Gastrointestinal or urologic malignancies

- Affects 15–20% of women aged 18 to 50 years in the United States

- Psychological factors such as a history of/current physical, sexual, or emotional abuse; depression; and anxiety are associated with greater pain-related disability

- Diagnosis is difficult and patients are often referred to many specialists while becoming frustrated, angry, and/or defensive

- Symptoms
  1. Paroxysms of sharp, stabbing, sometimes crampy, or dull continuous pain, usually severe
  2. Dysmenorrhea, dyspareunia, dysuria, vulvar or vaginal pain
  3. Pain may or may not be reproducible during abdominal and pelvic examination
  4. Feeling of pelvic pressure or heaviness
  5. Pain history is important—Onset, Location, Duration, Characteristics, Alleviating/aggravating factors and associated symptoms, Radiation, Temporal, Severity (OLDCARTS)

- Pelvic pain assessment forms are helpful

- Physical findings
  1. Physical and gynecologic examination may be normal
  2. Findings consistent with specific gynecologic, urologic, musculoskeletal, neurologic, gastrointestinal disorder
  3. Pain mapping may help to locate painful areas more specifically

- Differential diagnosis—see section titled “Etiology/incidence”

- Diagnostic tests/findings
  1. Laboratory studies are often of little value in the diagnosis of chronic pelvic pain
  2. Pregnancy test, CBC, erythrocyte sedimentation rate (ESR), urinalysis, tests for vaginal infections and STIs; stool for occult blood test
  3. Pelvic ultrasonography, hysteroscopy
  4. If bowel or urinary symptoms—barium enema, upper GI series, IV pyelogram
  5. If musculoskeletal disease suspected—lumbosacral radiography and orthopedic consultation
  6. Diagnostic laparoscopy—ultimate method of diagnosis

- Management/treatment
  1. Appropriate referral for treatment of organic pathology
  2. Referral for mental health counseling if no physical causes found; counseling for prior sexual trauma or domestic violence
  3. May need both medical and psychological management
  4. Supplemental therapies may include biofeedback, acupuncture, transcutaneous electrical nerve stimulation (TENS)
Pelvic Relaxation Disorders

- Definition—a nonspecific term denoting a condition occurring chiefly as weakness and defect in supportive muscles and ligaments of the pelvis that includes
  1. Cystocele—herniation of the bladder into the vaginal lumen
  2. Urethrocele—herniation of the urethra into the vagina
  3. Rectocele—bulging or herniation of the anterior rectal wall and posterior vaginal wall into the opening of the vagina
  4. Enterocoele—a portion of the small intestine herniates into the upper vagina or into the rectovaginal space
  5. Uterine prolapse—descent of the uterus and cervix into the vagina toward the introitus
- Etiology/incidence
  1. Weakness in supporting structures include the pelvic diaphragm, ligaments, and fascia—commonly related to neuromuscular injury during vaginal childbirth, which results in denervation injury of muscular floor; increased incidence with advancing age
  2. Other causes include conditions that cause chronic increase in abdominal pressure—obesity, straining, chronic lung disease (coughing); nerve function altered by diabetes, pelvic surgery, neurologic disorders; hypoestrogenism
- Symptoms
  1. May be asymptomatic and discovered during routine examination
  2. Pelvic, vaginal, and low back pain and pressure
  3. Bulging or mass in vagina; may make walking uncomfortable
  4. Urinary incontinence; incomplete bladder emptying; fecal incontinence; difficulty in evacuation of feces
  5. Dyspareunia
  6. Exposed vagina may become dry and ulcerated; purulent discharge
- Physical findings
  1. Bulging of the anterior or posterior vaginal walls; various degrees of descent of the cervix into the vagina indicating uterine prolapse; may need patient to do Valsalva straining maneuvers to assess full extent of prolapse
  2. Poor muscle strength in pubococcygeal muscles
  3. Complete prolapse of uterus (prodentia); ulceration, purulent discharge, bleeding
- Differential diagnosis
  1. Tumors of pelvis or abdomen involving any abdominal structure
  2. Diverticulum of urethra
  3. Diagnostic tests/findings—rule out tumors with appropriate evaluation as indicated
- Management/treatment
  1. Pelvic floor muscle strengthening exercises—Kegel's
  2. Physical therapy with pelvic floor muscle specialist—may include biofeedback and other modalities to improve quality of pelvic floor muscle exercises
  3. Local estrogen therapy for postmenopausal women
  4. Pessary—alternative to surgery, temporary relief before surgery, requires fitting and patient instruction on insertion/removal and care
  5. Surgical repair for severe prolapses

Cervical Cancer Screening Abnormalities

- Definition—findings on microscopic evaluation of epithelial cells of the cervix and endocervix suggestive of future or current cervical cancer; results may range in degree from atypia to mild, moderate, and severe abnormalities, to invasive cancer
- The 2014 Bethesda System for interpreting results of cervical cytology includes the following
  1. Specimen type—conventional Pap slide test, liquid-based preparation
  2. Specimen adequacy
    a. Satisfactory for evaluation; will note presence/absence of endocervical/transformation zone component
    b. Unsatisfactory for evaluation—specimen obscured by blood or inflammation, inadequate number of squamous cells, air-dried slide, not processed because unlabeled
  3. General categorization (optional)
    a. Negative for intraepithelial lesion or malignancy
    b. Epithelial cell abnormality—specifies whether squamous or glandular cells
    c. Other—for example, endometrial cells in a woman age 45 or older
- Interpretation/result
  a. Non-neoplastic cellular changes (optional to report)
    (1) Non-neoplastic variations—for example, squamous metaplasia, atrophy, pregnancy-associated changes
    (2) Reactive cellular changes associated with inflammation, radiation, IUD
    (3) Glandular status after a hysterectomy
  b. Organisms
    (1) *Trichomonas*
    (2) Fungal organisms consistent morphologically with *Candida* species
    (3) Shift in vaginal flora suggestive of bacterial vaginosis
    (4) Bacteria morphologically consistent with *Actinomyces* species
    (5) Cellular changes consistent with herpes simplex virus
    (6) Cellular changes consistent with cytomegalovirus
  c. Other—for example, endometrial cells in woman age 45 or older
- Epithelial cell abnormalities
  a. Squamous cell abnormalities
    (1) Atypical squamous cells of undetermined significance (ASC-US)—squamous cells do not appear completely normal but not able to determine cause of abnormal cells
    (2) Atypical squamous cells—cannot exclude high-grade squamous intraepithelial lesion (ASC-H)
    (3) Low-grade squamous intraepithelial lesion (LSIL)—encompasses transient HPV infection/mild dysplasia/cervical intraepithelial neoplasia 1 (CIN 1)
    (4) High-grade squamous intraepithelial lesion (HSIL)—encompasses persistent HPV infection/moderate dysplasia (CIN 2)/severe dysplasia or carcinoma in situ (CIN 3); includes identification of features consistent with invasion
  b. Glandular cell abnormalities
    (1) Atypical specified as endocervical, endometrial, glandular cells, or not otherwise specified (NOS)
Symptoms
- Flulike symptoms—headache, sore throat, myalgia, rigors, photophobia

Prevention
- Serologic tests to rule out Rocky Mountain spotted fever, syphilis, other

Organisms
- Candida
- Vaginal discharge, adnexal tenderness

Differential diagnosis
- Fever
- Adenocarcinoma identified as endocervical, endometrial, extruterine, or NOS
- Other—endometrial cells in women 45 years of age or older

Management/treatment
1. Specimen adequacy
   a. Satisfactory for evaluation—no action needed
   b. Unsatisfactory for evaluation—HPV unknown (any age) or HPV negative (age ≥ 30), repeat Pap test in 2 to 4 months; HPV positive (age ≥ 30), colposcopy or repeat Pap test in two to four months; if two consecutive unsatisfactory results, perform colposcopy
2. Organisms
   a. Trichomonas vaginalis—highly predictive but not 100%; treat if indicated
   b. Candida species—most are asymptomatic colonization and require no treatment; if symptomatic, treat
   c. Bacterial vaginosis—correlate with clinical findings; treat if indicated
   d. Actinomyces—evaluate for signs/symptoms of pelvic infection if intrauterine contraceptive (IUC) present; if patient has pelvic infection, remove IUC and treat with antibiotics; otherwise, no treatment or IUC removal needed
   e. Herpes simplex virus—high predictive value; counsel patient
   f. Cytomegalovirus—not likely to have clinical significance in asymptomatic, nonimmunocompromised women
3. Reactive changes associated with inflammation
   a. Examine—microscopy; STI tests as indicated
   b. Treat any identified cause
4. Endometrial cells in premenopausal woman with normal menstrual pattern—insignificant; must be evaluated with endometrial biopsy in postmenopausal woman or in premenopausal woman with abnormal bleeding
5. Atrophy—treat if symptomatic
6. Epithelial cell abnormalities (American Society for Colposcopy and Cervical Pathology [ASCCP], 2013) (see Table 6-3)

Toxic Shock Syndrome
- Definition—rare, potentially fatal, febrile condition affecting multiple systems
- Etiology/incidence
  1. Associated with toxins produced by strains of Staphylococcus aureus
  2. Occurs most often in Caucasian women younger than 30 years of age using highly absorbent tampons during menstruation; rarely associated with other articles placed in the vagina, such as diaphragms, sponges, and cervical caps
  3. Incidence is 1 to 2 per 100,000 per year in women using tampons
  4. Ten percent of population lacks sufficient antitoxin antibodies to S. aureus
  5. Nonmenstruating-associated cases (55%) are caused by puerperal sepsis, post-Cesarean endometritis, mastitis, PID, wound infection, insects
- Symptoms
  1. Sudden-onset fever, 102°F or greater
  2. Diffuse macular sunburnlike rash over face, trunk, and extremities that desquamates one to two weeks after onset
  3. Hyperemia of conjunctiva, oropharynx, tongue, vagina
  4. GI symptoms—nausea, vomiting, diarrhea, abdominal tenderness, dysphagia
  5. Genitourinary—vaginal discharge, adnexal tenderness
  6. Flu-like symptoms—headache, sore throat, myalgia, rigors, photophobia, arthralgia
  7. Cardiorespiratory—symptoms of pulmonary edema, disseminated intravascular coagulation (DIC), endocarditis, acute respiratory distress syndrome (ARDS)
- Organ failure symptoms—renal, hepatic
- Physical findings
  1. Fever
  2. Diffuse macular erythematous rash and desquamation
  3. Hyperemia of conjunctiva, oropharynx, tongue, vagina
  4. Orthostatic hypotension
  5. Abdominal tenderness
  6. Vaginal discharge, adnexal tenderness
  7. Physical signs of pulmonary edema, disseminated intravascular coagulation, endocarditis, acute respiratory distress syndrome (ARDS)
  8. Altered sensorium
- Differential diagnosis
  1. Septic shock
  2. Rocky Mountain spotted fever
  3. Scarlet fever
  4. Staph food poisoning
  5. Meningococcemia (meningitis)
  6. Legionnaires disease
  7. PID
- Diagnostic tests/findings
  1. Cultures to determine source of infection (e.g., throat, vagina, cervix, blood)
  2. Serologic tests to rule out Rocky Mountain spotted fever, syphilis, rubeola
  3. Urinalysis
  4. Evaluation for presence of multi-organ involvement—serum multichemical analysis, clotting profile, blood gases, CBC with differential (platelets numbering 100,000/mm³)
  5. Diagnostic criteria includes involvement of three or more organs or systems that include cardiopulmonary, central nervous system (CNS), hematologic, liver, renal, mucous membranes, musculoskeletal, gastrointestinal
- Management/treatment
  1. Refer immediately to hospital for emergency treatment in intensive care setting
  2. Prevention
     a. Avoidance of tampons or leave in place no longer than four hours; alternate with pads
### Table 6-3 Management of Women with Abnormal Cervical Cancer Screening Results

#### Women Ages 21 to 24—Routine Screening Pap Test Only Every Three Years

<table>
<thead>
<tr>
<th>Pap unsatisfactory for evaluation</th>
<th>ASC-US</th>
<th>LSIL</th>
<th>ASC-H</th>
<th>HSIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeat Pap in 2 to 4 months.</td>
<td>Preferred</td>
<td>Repeat Pap test in 12 months.</td>
<td>Repeat Pap test in 12 months.</td>
<td>Colposcopy</td>
</tr>
<tr>
<td>If unsatisfactory—colposcopy.</td>
<td>Repeat Pap test in 12 months.</td>
<td>Repeat Pap test in 12 months.</td>
<td>Repeat Pap test in 12 months.</td>
<td>Colposcopy</td>
</tr>
<tr>
<td>If negative—repeat Pap test in 3 years.</td>
<td>If negative—repeat Pap test in 3 years.</td>
<td>If negative—repeat Pap test in 3 years.</td>
<td>Reflex HPV test is not recommended.</td>
<td></td>
</tr>
<tr>
<td>If ≥ ASC—colposcopy.</td>
<td>Reflex HPV test.</td>
<td>Reflex HPV test.</td>
<td>Reflex HPV test.</td>
<td>Colposcopy</td>
</tr>
<tr>
<td>Acceptable</td>
<td>Repeat Pap test in 12 months.</td>
<td>Repeat Pap test in 12 months.</td>
<td>Repeat Pap test in 12 months.</td>
<td>Colposcopy</td>
</tr>
<tr>
<td>If HPV negative—repeat Pap test in 3 years.</td>
<td>If HPV negative—repeat Pap test in 3 years.</td>
<td>If HPV negative—repeat Pap test in 3 years.</td>
<td>Reflex HPV test is not recommended.</td>
<td></td>
</tr>
<tr>
<td>If HPV positive—repeat Pap test in 12 months.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Women Ages 25 to 29—Routine Screening Pap Test Only Every Three Years

<table>
<thead>
<tr>
<th>Pap unsatisfactory for evaluation</th>
<th>ASC-US</th>
<th>LSIL</th>
<th>ASC-H</th>
<th>HSIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeat Pap in 2 to 4 months.</td>
<td>Preferred</td>
<td>Repeat Pap test in 12 months.</td>
<td>Repeat Pap test in 12 months.</td>
<td>Colposcopy</td>
</tr>
<tr>
<td>If unsatisfactory—colposcopy.</td>
<td>Repeat Pap test in 12 months.</td>
<td>Repeat Pap test in 12 months.</td>
<td>Repeat Pap test in 12 months.</td>
<td>Colposcopy</td>
</tr>
<tr>
<td>If HPV negative, repeat Pap test in 3 years.</td>
<td>Reflex HPV test.</td>
<td>Reflex HPV test.</td>
<td>Reflex HPV test.</td>
<td>Immediate excisional treatment or colposcopy</td>
</tr>
<tr>
<td>If HPV positive—colposcopy.</td>
<td>Repeat Pap test in 12 months.</td>
<td>Repeat Pap test in 12 months.</td>
<td>Repeat Pap test in 12 months.</td>
<td>Colposcopy</td>
</tr>
<tr>
<td>Acceptable</td>
<td>Repeat Pap test in 12 months.</td>
<td>Repeat Pap test in 12 months.</td>
<td>Repeat Pap test in 12 months.</td>
<td>Colposcopy</td>
</tr>
<tr>
<td>If HPV negative—repeat Pap test in 3 years.</td>
<td>Reflex HPV test.</td>
<td>Reflex HPV test.</td>
<td>Reflex HPV test.</td>
<td>Immediate excisional treatment or colposcopy</td>
</tr>
<tr>
<td>If HPV positive—repeat Pap test in 12 months.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Women Age 30 and Older—Routine Screening Preferred Co-testing Every Five Years; Acceptable Pap Test Alone Every Three Years

<table>
<thead>
<tr>
<th>Pap unsatisfactory for evaluation</th>
<th>Normal Pap HPV positive</th>
<th>ASC-US HPV negative</th>
<th>ASC-US HPV positive</th>
<th>LSIL with no HPV test</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPV unknown or negative. Repeat Pap in 2 to 4 months.</td>
<td>Acceptable</td>
<td>Co-testing in 12 months.</td>
<td>Repeat co-testing in 3 years.</td>
<td>Colposcopy</td>
</tr>
<tr>
<td>If unsatisfactory—colposcopy. HPV positive. Co-testing or repeat Pap in 2 to 4 months.</td>
<td></td>
<td></td>
<td></td>
<td>Colposcopy</td>
</tr>
<tr>
<td>If unsatisfactory—colposcopy.</td>
<td>Acceptable</td>
<td>HPV typing.</td>
<td></td>
<td>Immediate excisional treatment or colposcopy</td>
</tr>
<tr>
<td>If HPV 16 or 18 positive—colposcopy.</td>
<td></td>
<td></td>
<td></td>
<td>Immediate excisional treatment or colposcopy</td>
</tr>
<tr>
<td>If HPV 16 and 18 negative—repeat co-testing in 1 year.</td>
<td></td>
<td></td>
<td></td>
<td>Immediate excisional treatment or colposcopy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LSIL HPV negative</th>
<th>LSIL HPV positive</th>
<th>ASC-H</th>
<th>HSIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred</td>
<td>Repeat co-testing in 12 months.</td>
<td>Repeat co-testing in 12 months.</td>
<td>Colposcopy</td>
</tr>
<tr>
<td></td>
<td>If Pap and HPV negative—repeat co-testing in 3 years.</td>
<td>Repeat co-testing in 3 years.</td>
<td>Colposcopy</td>
</tr>
<tr>
<td></td>
<td>If Pap ≥ ASC or HPV positive—colposcopy.</td>
<td>Repeat co-testing in 3 years.</td>
<td>HSIL</td>
</tr>
<tr>
<td></td>
<td>Acceptable</td>
<td>COLPOSCOPY</td>
<td>COLPOSCOPY</td>
</tr>
<tr>
<td></td>
<td>Collposcopy</td>
<td>Collposcopy</td>
<td>Immediate excisional treatment or colposcopy</td>
</tr>
</tbody>
</table>


b. Educate regarding signs and symptoms if using cervical cap, diaphragm, sponge and need for prompt treatment
c. History of TSS—avoid tampons, cervical caps, diaphragms, sponges

**Diethylstilbestrol (DES) in Utero**

- Definition—a synthetic nonsteroidal estrogen approved by the FDA for use from 1940 to 1971 to prevent miscarriage and premature labor; prenatal DES exposure increased risk for reproductive abnormalities, infertility, clear cell adenocarcinoma of the cervix and vagina
- Etiology/incidence
  1. Vagina originally lined with columnar epithelium, which is eventually replaced with squamous epithelium; if DES is introduced, that transformation is not completed; one-third of exposed females have columnar epithelium in the vagina (adenosis)
2. Structural changes of the cervix and vagina occurred in 25% of females exposed in utero to DES; transverse vaginal septum, cervical collar, uterine constriction band
3. Occurrence of these abnormalities was related to the dose of medication and the first time exposed; risk is significant if administration was begun after the 18th week of gestation
4. Increased incidence of preterm delivery, spontaneous abortion, and ectopic pregnancy
5. Clear cell carcinoma of the vagina occurs rarely—a 1/1,000 risk; highest risk for DES-exposed females in their early 20s
6. Columnar epithelium of vagina is especially susceptible to HPV
7. Twenty-five percent of male offspring affected with cryptorchidism, small testes, epididymal cysts
8. Most women exposed to DES in utero are now 35 years of age or older
9. Few data thus far support that reproductive tract effects may be passed on to DES granddaughters and grandsons, but studies are ongoing

- Symptoms
  1. Asymptomatic unless has complications related to exposure
  2. May have discharge, postcoital bleeding with cervical or vaginal cancer
  3. May report infertility; poor pregnancy outcomes

- Physical findings
  1. Vaginal adenosis (most common)—glandular tissue extends from endocervix into vagina with a red, granular appearance
  2. Nodularity of cervix or vagina
  3. Visible cervical abnormalities (e.g., ridges, cockscomb, collar, hood on anterior cervix, pseudopolyps, hypoplasia)
  4. Transverse or longitudinal vaginal septum
  5. Uterine abnormalities—T-shaped uterus, bicornate or didelphis uterus, septate uterus

- Differential diagnosis
  1. Congenital anomalies
  2. Genetic disorders

- Diagnostic tests/findings
  1. Pap test of cervix and all four vaginal walls to rule out cancer
  2. Colposcopy and biopsy of suspicious areas
  3. Hysterosalpingogram or ultrasonography to evaluate structural anomalies

- Management/treatment
  1. Follow annually with Pap test, with separate specimens from cervix and all four vaginal walls
  2. Thorough palpation of cervix and vaginal walls for masses
  3. Colposcopy and/or iodine staining to enhance vaginal wall inspection for adenosis may be considered
  4. Refer if abnormality suspected

**Sexual Dysfunction**

- Definition—heterogeneous group of disorders typically characterized by individual’s inability to respond sexually or to experience sexual pleasure; DSM-5 criteria include experiencing the disorder at least 75% of the time for at least six months and causing significant distress for the individual

1. Female
   a. Sexual interest/arousal disorder—complete lack of or significant reduction in sexual interest or sexual arousal
   b. Orgasmic disorder—significant change in orgasm such as delay in, reduction of intensity, infrequency, or absence
   c. Genito-pelvic pain/penetration disorder—persistent or recurrent difficulties in relation to vaginal penetration
      1. Dyspareunia—genital pain associated with sexual intercourse
      2. Vaginismus—recurrent or persistent involuntary spasm of the musculature of the outer third of the vagina
      3. Noncoital pain—for example, vulvodynia, endometriosis, bladder pain syndrome

2. Male
   a. Hypoactive sexual desire disorder—persistent or recurrent deficient or absent sexual fantasies and desire for sexual activity
   b. Delayed ejaculation—unable to ejaculate during sexual activity, specifically after 25 to 30 minutes of continuous sexual stimulation
   c. Premature ejaculation—early ejaculation during vaginal intercourse; individual feels unable to control orgasm, climaxes in less than one minute after vaginal penetration; no duration for oral or manual stimulation established
   d. Erectile disorder (ED)—recurrent inability to achieve or maintain an adequate erection during partnered sexual activities

- Etiology/incidence
  1. Prevalence of Female Sexual Problems Associated with Distress and Determinants of Treatment Seeking (PRESIDE) Survey (Shifren, Monz, Russo, et al., 2008)—over 30,000 participants; 43% reported at least one problem with sexual desire, arousal, or orgasm with/without personal distress; 22% of those reporting a problem indicated personal distress

2. Causes
   a. Relationship factors; other life stressors; medical conditions; medications; substance abuse; current or past physical, emotional, or sexual abuse; history of sexual assault
   b. Medical conditions—depression; diabetes; thyroid disease; cardiovascular disease; neurologic diseases; chronic pain syndromes; urinary incontinence; androgen insufficiency; estrogen deficiency
   c. Medications—some antidepressants, antihypertensives, lipid-lowering agents, digoxin, combined hormonal contraceptives, histamine H2-receptor blockers, opioids, amphetamines, anticonvulsants

- Symptoms—see definitions for specific sexual dysfunctions; may be lifelong, acquired, or situational

- Physical findings
  1. Related to contributing medical conditions
  2. Female—genital/pelvic tenderness, lesions, atrophy, masses, muscle spasms related to underlying cause for genito-pelvic pain/penetration disorder
  3. Male—testicular atrophy, abnormal genital reflexes, penile abnormalities related to underlying causes for hypoactive sexual desire disorder or ED

- Differential diagnosis—focused on determining causative factors

- Diagnostic tests/findings—only if indicated by history and physical exam findings; androgen levels and estrogen levels are not recommended
Management/treatment—dependent on specific dysfunction and causative factors

1. PLISSIT model
   a. Permission—validate concerns, express that sexual problems are real and prevalent
   b. Limited Information—provide basic education about sexual response cycle, components of desire, identified causes of problem
   c. Specific Suggestions—lubricants, erotica, enhancing clitoral stimulation, positioning for comfort
   d. Intensive Therapy—referral to sex specialist for cognitive behavioral psychotherapy focused on sexual concern and solution focused

2. Treat medical conditions and change causative medications when appropriate
3. Treat specific causes of genito-pelvic pain if identified
4. Low-dose localized estrogen for postmenopausal vulvovaginal atrophy
5. Flibanserin—FDA approved (2015) with indication for treatment of hypoactive sexual desire disorder in premenopausal women
6. Sildenafil, vardenafil, tadalafil—FDA approved with indication for treatment of ED; not FDA approved for use in women
7. Referral to therapist specializing in sexual dysfunction, mental health specialists, physical therapist specializing in pelvic floor dysfunction, urologist for males with ED

Infertility

• Definition—inability to conceive after one year of unprotected coitus if under age 35; after six months if 35 years of age or older; inability to carry a pregnancy to live birth

• Etiology/incidence
1. Estimated infertility in United States is 6–15% of women
2. Female factors (25–50%)
   a. Ovulatory dysfunction—anovulation, luteal phase insufficiency, poor ovarian reserve, inadequate cervical mucous
   b. Pelvic pathology—uterine anomaly, adhesions from surgery or peritonitis, tubal occlusion, endometriosis
3. Male factors (25–50%)
   a. Low sperm production—low testosterone (hypogonadism), varicocele, toxin exposure (radiation, chemicals, drugs), chronic overheating of testicles, mumps orchitis (testicular inflammation)
   b. Adhesions in vas deferens—epididymitis, genital tract surgery
   c. Anatomic abnormalities
      1. Varicocele—abnormal dilation of peritesticular veins resulting in varicose veins in the spermatic cord
      2. Hypospadias—congenital defect in which urethral meatus is located on ventral surface of glans, penile shaft, or perineal area
      3. Phimosis—tight foreskin that cannot be retracted, may be congenital or result of recurrent infections of the glans penis and prepuce
      4. Retrograde ejaculation (obstruction)
   d. Erectile dysfunction
4. Combined male and female factors (30%)
5. Unexplained cause (10–25%)

• Symptoms
1. Related to causative factors (female)—abnormal menses, pelvic pain, dyspareunia, hirsutism, galactorrhea
2. Related to causative factors (male)—erectile dysfunction, testicular pain
3. Related to other contributing health conditions—thyroid disorder, diabetes

• Physical findings
1. Related to causative factors (female)—galactorrhea, abdominal/pelvic tenderness or mass, signs of androgen excess
2. Related to causative factors (male)—varicocele, a soft mass feeling like a bag of worms on proximal side of spermatic cord when male is standing; hypospadias; phimosis; signs of androgen deficiency
3. Related to other contributing health conditions—thyroid disorder; diabetes

• Differential diagnosis—related to determining specific cause or causes

• Diagnostic tests/findings
1. Pelvic ultrasound—uterine anomalies; ovarian volume; persistent ovarian cysts
2. Hysterosalpingogram—tubal patency
3. Basal body temperatures for ovulation detection
4. Ovulation prediction tests—home urine tests to detect LH surge; predicts ovulation within 24 to 26 hours
5. Anti-Müllerian hormone level and antral follicle count to determine ovarian reserve
6. FSH, LH, estradiol (E2), progesterone levels
7. TSH level
8. Prolactin level
9. STI screening if indicated (female and male)
10. Semen analysis—semen volume; sperm number; sperm concentration, motility, vitality, morphology, pH

• Management/treatment
1. Ovulatory dysfunction—ovulation induction therapy with clomiphene citrate, letrozole
2. Luteal phase defect—vaginal or IM progesterone
3. Infections/endometriosis—appropriate therapy
4. Tubal occlusion/obstruction—surgery
5. Varicocele—surgical repair
6. Intrauterine insemination—if male has oligospermia and female has normal evaluation, separate motile from nonmotile sperm and other seminal material that may have detrimental effects on fertilization; may combine with ovarian hyperstimulation
7. Assisted reproductive technology (ART)—all the techniques used to achieve pregnancy that involve direct retrieval of oocytes from the ovary
   a. In vitro fertilization (IVF)—oocytes are extracted, fertilized in the laboratory, then transferred through the cervix into the uterus (most common procedure, success rate 15–20%)
   b. Gamete intrafallopian transfer (GIFT)—placement of oocytes and sperm into the fallopian tube (25% success rate)
   c. Zygote intrafallopian transfer (ZIFT)—placement of fertilized oocytes into the fallopian tube (18–20% successful)
Congenital and Chromosomal Abnormalities

Müllerian Abnormalities
- Definition—congenital anomalies involving the uterus, fallopian tubes, and upper vagina resulting from absence of anti-Müllerian hormone (AMH)
- Etiology/incidence
  1. Possible causes include teratogenesis, genetic inheritance, and multifactorial expression
  2. Up to 15% of women with recurrent spontaneous abortion and 5–19% of infertile women have Müllerian abnormality
- Symptoms
  1. History of pregnancy loss or infertility
  2. Amenorrhea, dysmenorrhea
  3. Dyspareunia
- Physical findings
  1. Many variations may occur
    a. Lack of development (agenesis), that is, no vagina, uterus, tubes, uterine cavity
    b. Incomplete development (hypoplasia), that is, partial vagina, bicornate uterus, partial uterine cavity
    c. Incomplete canalization (atresia), that is, imperforate hymen, cervical atresia
    d. One-third have urinary tract abnormalities (e.g., ectopic kidney, renal agenesis, horseshoe-shaped kidney, abnormal collecting ducts)
  2. Ovaries may be developed, resulting in well-developed secondary sexual characteristics
- Differential diagnosis
  1. Various congenital anomalies
  2. Anomalies of urinary tract
  3. Primary amenorrhea
- Diagnostic tests/findings
  1. Structural abnormalities detected by ultrasonography, MRI, hysterosalpingogram, laparoscopy
  2. Chromosomal abnormalities ruled out with karyotyping (46XX)
- Management/treatment
  1. Referral to reproductive endocrinologist
  2. Surgical intervention

Androgen Insensitivity/Resistance Syndrome
- Definition—genetically transmitted androgen receptor defect; individual is genotypic male (46XY) but phenotypic female or has both female and male characteristics; individual has testes that may be partially descended or intra-abdominal
- Etiology/incidence
  1. Transmitted by maternal X-linked recessive gene; a defect in androgen receptors; 25% risk of affected child; 25% risk of carrier
  2. Third most common cause of primary amenorrhea; represents 10% of all cases
  3. Risk of malignant transformation of gonads (5%); incidence of malignancy is rare before puberty
- Symptoms
  1. Often not detected until puberty
  2. Primary amenorrhea
  3. Infertility
- Physical findings
  1. Uterus and ovaries are absent and a blind pouch vagina is present; labia underdeveloped; absent or scant pubic hair
  2. Normally developed breast with small nipples and pale areola
  3. Inguinal hernias (50%) or labial masses in infant child due to partially descended testes; testes may be intra-abdominal
  4. Scant body hair
  5. Growth and development are normal; overall height usually greater than female average
  6. May have horseshoe kidneys
- Differential diagnosis
  1. Müllerian anomalies (agenesis)
  2. Incomplete androgen insensitivity
- Diagnostic tests/findings
  1. Karyotype reveals 46XY; phenotypically female or has both female and male characteristics
  2. Testosterone greater than 3 ng/mL and LH levels normal to slightly elevated
- Management/treatment
  1. Once full development is attained (after puberty), gonads should be removed at about age 16 to 18 years
  2. Estrogen replacement therapy after gonads removed
  3. Evaluate other family members; sensitive counseling

Turner’s Syndrome
- Definition—gonadal dysgenesis; an abnormality in or an absence of one of the X chromosomes; phenotypically female
- Etiology/incidence
  1. Usually a deficiency of paternal contribution of sex chromosomes reflecting paternal nondisjunction
  2. Occurs in 1 out of 2,500 to 5,000 live-born girls
  3. Most common chromosomal abnormality found on spontaneous abortuses (45X)
  4. Sixty percent of individuals with Turner’s syndrome have a total loss of one X chromosome; 40% are mosaics or have structural aberrations in the X or Y chromosome
- Symptoms
  1. Turner phenotype recognizable at any time of development
    a. Short stature, webbed neck, shield chest with widely spaced nipples, increased carrying angle of elbow, arched palate, low neck hairline, short fourth metacarpal bones, disproportionately...
Breast Disorders

Fibrocystic Breast Changes

- **Definition**—“nondisease” that includes nonproliferative microcysts, macrocysts, and fibrosis; and proliferative changes such as hyperplasia and adenosis; hyperplasia with atypia is associated with a moderate risk for breast cancer
  1. Cystic changes—refers to dilatation of ducts; may regress with menses, may persist, or may disappear and reappear
  2. Fibrous change—mass develops following an inflammatory response to ductal irritation
  3. Hyperplasia—a layering of cells; has malignant potential if atypical
  4. Adenosis—related to changes in the acini in the distal mammary lobe; ducts become surrounded by a firm, hard, plaquelike material

- **Etiology/incidence**
  1. Etiology not understood; occurs in response to endogenous hormone stimulation, primarily estrogen
  2. Conflicting studies on association with ingestion of foods or beverages containing methylxanthines
  3. Most common benign breast condition in women
  4. Palpable nodular changes observed in more than half of adult women 20 to 50 years of age; most common ages 35 to 50 years
  5. Detectable on radiography in 90% of women age 40 or older
  6. Usually a regression of the signs after menopause

- **Symptoms**
  1. Breast pain and nodularity; usually bilateral
  2. Frequently occurs or increases one to two weeks before menses
  3. May have clear or white nipple discharge

- **Physical findings**
  1. Multiple, usually cystic masses that are well defined, mobile, and often tender
  2. Absence of breast skin changes
  3. Most common sites—upper outer quadrant and axillary tail
  4. May have clear to white nipple discharge

- **Differential diagnosis**
  1. Carcinoma
  2. Galactorrhea
  3. Mastitis
  4. Costochondritis

- **Diagnostic tests/findings**
  1. Usually none needed
  2. Mammography to identify and characterize masses if age 40 or older
  3. Ultrasound to determine whether mass is cystic
  4. Fine needle aspiration (FNA) if dominant mass; cytologic evaluation
  5. Biopsy or excision if dominant mass or following findings are present
      a. Bloody fluid on aspiration
      b. Failure of mass to disappear after aspiration
      c. Recurrence of a cyst after two aspirations
      d. Solid mass not diagnosed as fibroma
      e. Bloody nipple discharge
      f. Nipple ulceration; presence of skin edema or erythema

- **Management/treatment**
  1. Treatment not necessary
  2. Aspiration of palpable cysts may be curative
  3. Patients with symptomatic nodularity or with mastalgia may be treated with nonpharmacologic or pharmacologic therapies
      a. Reassurance; supportive bra
      b. NSAIDs—oral or topical
      c. Reduction in methylxanthines (caffeine, tea, cola, chocolate) has shown limited effectiveness
      d. Hormonal contraception may decrease or increase mastalgia
      e. Danazol, tamoxifen, bromocriptine have all been used to treat severe mastalgia; each has major side effects that limit utility; mastalgia typically returns when discontinue use
Fibroadenoma
- Definition—benign breast mass derived from fibrous and glandular tissue
- Etiology/incidence
  1. Etiology unknown—development soon after menarche; appears to be hormone related
  2. Most common benign, dominant mass in younger women
  3. Occurs most often in women 15 to 25 years of age
  4. Pregnancy may stimulate growth; may regress with menopause
- Symptoms
  1. Painless, single, round, rubbery mass
  2. No nipple discharge
  3. Does not change with menstrual cycle
- Physical findings
  1. Firm, well-delineated, freely movable, smooth, rubbery, round, typically 2 to 4 cm marble-sized, nontender mass; usually unilateral; may grow up to 15 cm
  2. No nipple discharge
  3. No breast skin changes
- Differential diagnosis
  1. Carcinoma of the breast
  2. Cystosarcoma phyllodes
  3. Benign cyst
- Diagnostic tests/findings
  1. Fine needle aspiration (FNA) to determine whether cystic or solid
  2. Excisional biopsy
  3. Ultrasonography and/or mammography will help distinguish singular from multiple nonpalpable masses (ultrasound best choice for young women)
- Management/treatment
  1. Observation, if diagnosis is confirmed and patient is younger than 25 years
  2. May be removed to alleviate patient anxiety or if diagnosis is uncertain
  3. Follow up with annual breast examination by clinician; screening mammograms per current professional organization recommendations
  4. Key points
     a. No mass is obviously benign—each should be carefully evaluated to rule out carcinoma
     b. Nipple discharge is seldom associated with carcinoma of the breast; when there is spontaneous clear, serous, or bloody discharge or postmenopausal discharge present, cancer should be ruled out with a thorough evaluation
     c. Breast discomfort is usually associated with fibrocystic changes

Intraductal Papilloma
- Definition—benign lesion of the lactiferous duct; most common in the perimenopausal age group, 35–50 years old
- Etiology/incidence
  1. Proliferation and overgrowth of epithelial tissue of the subareolar collection duct
  2. Most common cause of pathologic nipple discharge
- Symptoms
  1. Bloody, serous, or turbid discharge (not milk), which may occur spontaneously
  2. Mass not usually palpable
  3. Feeling of fullness or pain beneath areola (possible)
- Physical findings
  1. Expression of serosanguinous nipple discharge from a single duct when pressure applied to affected duct
  2. Poorly delineated, soft mass may be palpated
  3. Papilloma are usually singular
  4. No breast skin changes
- Differential diagnosis
  1. Intraductal carcinoma
  2. Multiple papillomatosis
- Diagnostic tests/findings
  1. Excisional biopsy of duct allows for definitive evaluation
  2. Cytology of fluid—false-negative rates of 20% for cancer
  3. Mammography and/or ultrasound depending on age
  4. Radiologic ductogram—use is controversial, low sensitivity
- Management
  1. Refer for surgical excision
  2. Excisional biopsy is curative

Mammary Duct Ectasia
- Definition—dilation of ducts with surrounding inflammation and fibrosis
- Etiology/incidence
  1. Most common in women age 50 and older; increased incidence in smokers
  2. Widening of ducts and thickening of duct walls—ducts fill with desquamated ductal epithelium and secretory proteinaceous contents
  3. Skin bacteria collecting in duct may cause inflammation and pain
- Symptoms
  1. Green, brown, or black discharge; spontaneous; often bilateral
  2. May have burning, itching, sensation of pulling in nipple area
- Physical findings
  1. Multicolor, sticky, bilateral, multiductal discharge
  2. May have palpable mass behind nipple
  3. No breast skin changes
- Differential diagnoses
  1. Intraductal carcinoma
  2. Breast cancer
- Diagnostic tests/findings
  1. Mammography
  2. Biopsy if mass present
- Management
  1. Anti-inflammatory drugs
  2. Antibiotics
  3. Smoking cessation
Breast Carcinoma

- Definition—malignant neoplasm of the breast

- Etiology/incidence
  1. Possible interaction of ovarian estrogen and non-ovarian estrogen; estrogen of exogenous origin with susceptible breast tissue
  2. Most common female malignancy—second to lung cancer as leading cause of cancer-related death
  3. Approximately 245,000 new cases of breast cancer are diagnosed and 40,000 deaths from breast cancer occur each year (National Cancer Institute, 2016)
  4. Incidence increases with age (75% are > 40 years of age)
  5. Cumulative lifetime risk is 12.3%, or 1 in 8
  6. Risk factors
    a. Advancing age
    b. Family history of breast cancer in one or more first-degree relative especially at early age or if male relative
    c. Inherited gene mutations are responsible for approximately to 5–10% of breast cancers with most common mutations in BRCA1 or BRCA2 genes
      (1) An estimated 1 in 300 to 500 individuals in the general population carry a mutation in BRCA1 or BRCA2
      (2) An estimated 1 in 40 individuals of Ashkenazi Jewish ancestry carry the mutation
      (3) Lifetime risk for breast cancer associated with mutations in one or both genes is 65–74%
    d. Other hereditary cancer syndromes associated with breast cancer include Li-Fraumeni, Cowden, and Peutz-Jeghers; gene mutations in these syndromes often result in cancers that affect multiple organs
    e. Personal history of breast, endometrial or colon cancer
    f. Biopsy-confirmed atypical hyperplasia
    g. Dense breasts
    h. High-dose radiation to chest
      i. High bone density (postmenopausal)
    j. Menarche before age 12; menopause after age 55
    k. Nulliparity, first full-term pregnancy after 30
    l. Hormone therapy, oral contraceptive pills (conflicting data)
    m. Obesity (postmenopausal)
    n. Heavy alcohol use

- Symptoms
  1. Breast mass—most often upper-outter quadrant
  2. May have spontaneous clear, serous, or bloody nipple discharge
  3. May have retraction, dimpling, skin edema, erythema, irritation

- Physical findings
  1. Mass fixed, poorly defined, irregular, usually nontender

- Differential diagnosis
  1. Fibroadenoma
  2. Fibrocystic breast changes
  3. Trauma
  4. Mastitis

- Diagnostic tests/findings
  1. Mammogram detects 30–50% of cancers
  2. Ultrasound to distinguish solid from cystic mass
  3. Histology for definitive diagnosis—specimen obtained through open biopsy, needle biopsy, fine needle aspiration, or stereotactic core needle biopsy
  4. Magnetic resonance imaging (MRI)—may be useful in identification of multifocal, multifacentric, or contralateral tumors
  5. CT scan of liver, lungs, bone to rule out metastasis
  6. Presence of estrogen receptors determined by assay
  7. Sentinel node biopsy
  8. Negative mammogram and negative aspiration cytology does not exclude malignancy

- Management/treatment
  1. Referral to oncologist if malignancy is suspected; staging determines appropriate treatment options
  2. Early breast cancer—surgery or surgery and radiation; 60–70% choose lumpectomy, axillary node dissection, and breast radiation
  3. Medical therapy for hormone receptor positive tumors—tamoxifen, aromatase inhibitors
  4. Radiotherapy and cytotoxic chemotherapy are adjuvant therapy in late disease
  5. Consider genetic counseling and genetic testing if indicated for the following
    a. Women with breast cancer diagnosis who have risk factors for hereditary breast or ovarian cancer syndrome (BRCA1/BRCA2 mutations)
    b. Family members if woman with breast cancer diagnosis has positive test for BRCA1/BRCA2 mutations
    c. Women assessed to be at high risk for hereditary breast and ovarian cancer syndrome because of specific personal or family cancer history characteristics or known BRCA1/BRCA2 gene mutation in family member; results may guide discussion regarding additional or more frequent screening and risk-reducing surgeries

Questions

Select the best answer.

1. Premenstrual syndrome is suspected when a woman experiences symptoms only during:
   a. ovulation.
   b. the luteal phase.
   c. the LH surge.
   d. the follicular phase.

2. Primary dysmenorrhea can best be treated with:
   a. dopamine agonists.
   b. GnRH agonists.
   c. prostaglandin inhibitors.
   d. tricyclic antidepressants.
3. The most common cause for chronic pelvic pain in reproductive-age women is:
   a. adenomyosis.
   b. endometriosis.
   c. pelvic inflammatory infection.
   d. uterine fibroids.

4. Which of the following contraceptive methods has also been FDA approved for treatment of endometriosis?
   a. Combination oral contraceptive pills
   b. Levonorgestrel IUS
   c. Progestin-only contraceptive pills
   d. Sub Q 104 DMPA

5. A complication of pelvic inflammatory disease is:
   a. adenomyosis.
   b. endometriosis.
   c. infertility.
   d. irritable bowel syndrome.

6. The most common cause of urge urinary incontinence is:
   a. detrusor irritability.
   b. neuromuscular injury.
   c. pelvic organ prolapse.
   d. sphincter incompetence.

7. During a vaginal examination, you observe bulging of the anterior wall when you ask the patient to bear down. This is most likely a:
   a. congenital abnormality.
   b. cystocele.
   c. rectocele.
   d. uterine prolapse.

8. The definitive diagnosis of endometriosis is made with:
   a. a CT scan.
   b. laparoscopy.
   c. serum CA-125.
   d. transvaginal ultrasound.

9. Adenomyosis can be suspected when a woman has a(n):
   a. boggy, tender uterus.
   b. enlarged, irregularly shaped uterus.
   c. fixed retroverted uterus.
   d. prolapsed uterus.

10. The most common benign neoplasm of the cervix is:
    b. squamous papilloma.
    c. pedunculated myoma.
    d. polyp.

11. A 22-year-old female presents with complaint of malodorous vaginal discharge and vulvar itching. On examination, a watery, yellowish-green vaginal discharge is noted, along with vulvar and vaginal erythema. The most likely findings on a wet mount examination will be:
    a. clue cells.
    b. Lactobacilli.
    c. pseudohyphae.
    d. trichomonads.

12. Characteristics of Turner's syndrome include:
    a. uterus absent, ovaries absent.
    b. uterus absent, ovaries present.
    c. uterus present, ovaries absent.
    d. uterus present, ovaries present.

13. A 58-year-old woman complains of severe vulvar pruritus. On examination of the vulva, you note thinning of the epidermis and loss of pigmentation, as well as maculopapular lesions. You suspect the diagnosis may be:
   a. lichen sclerosus.
   b. local allergic reaction.
   c. lichen simplex chronicus.
   d. vulvodynia.

14. Treatment of molluscum contagiosum includes:
   a. azithromycin 1 g orally in a single dose.
   b. erythromycin base 500 mg orally four times a day for 21 days.
   c. trichloracetic or bichloracetic acid (80–90% solution).
   d. cryotherapy with liquid nitrogen.

15. Which of the following best describes the mechanism of action of tranexamic acid in the treatment of heavy menstrual bleeding?
   a. Acts as an antifibrinolytic to block lysis of fibrin clots
   b. Causes rapid growth of the endometrium to control an acute, heavy bleeding episode
   c. Increases the ratio of vasoconstricting prostaglandins to vasodilating prostaglandins
   d. Suppresses endometrial proliferation to manage chronic heavy menstrual bleeding

16. Hirsutism is most commonly seen with:
   a. androgen insensitivity syndrome.
   b. Asherman's syndrome.
   c. polycystic ovarian syndrome.
   d. Turner's syndrome.

17. A 22-year-old experiences six months of amenorrhea. Laboratory test results include normal prolactin and thyroid-stimulating hormone and negative pregnancy test. The next action will be to:
   a. administer a progestin challenge test.
   b. measure testosterone.
   c. order a hysterosalpingogram.
   d. order an MRI or CT scan of pituitary gland.

18. Prophylaxis for recurrent UTI/cystitis may include:
   a. oral estrogen therapy for vaginal atrophy/genital syndrome of menopause.
   b. regular use of barrier contraceptive methods or spermicide.
   c. single-dose oral nitrofurantoin after sexual intercourse.
   d. six-month prophylaxis regimen with oral doxycycline.

19. The pain of primary dysmenorrhea is:
   a. always associated with pathology such as endometriosis.
   b. colicky, spasmodic, sometimes radiating up the back to the shoulders.
   c. colicky, spasmodic, sometimes radiating to the thighs and low back.
   d. a dull ache associated with underlying pathology.

20. A 16-year-old woman has not yet begun menstruating but does have pubic hair. She is best described as having:
   a. Asherman's syndrome.
   b. oligomenorrhea.
   c. primary amenorrhea.
   d. secondary amenorrhea.

21. Which of the following is the most accurate method to predict the occurrence of ovulation?
   a. Huhner's test
   b. Evaluation of cervical mucus
   c. LH surge test
   d. Basal body temperature
22. Toxic shock syndrome should be suspected in a woman presenting with sudden-onset fever, flu-like symptoms, recent tampon use, and:
   a. dysuria.
   b. heavy vaginal bleeding.
   c. pale conjunctiva and vaginal walls.
   d. macular rash on face and trunk.
23. Which of the following components of the PLISSIT model would best describe instructing a couple on the use of water-soluble lubrication for dyspareunia caused by vaginal dryness?
   a. Permission giving
   b. Limited information
   c. Specific suggestions
   d. Intensive therapy
24. Polycystic ovarian syndrome predisposes to an increased incidence of:
   a. adrenal tumors.
   b. endometriosis.
   c. endometrial cancer.
   d. ovarian cancer.
25. In which of the following conditions would you expect to have a positive progestin challenge test?
   a. Androgen insensitivity syndrome
   b. Asherman's syndrome
   c. Polycystic ovarian syndrome
   d. Turner's syndrome
26. The most common presenting symptom of vulvar cancer is:
   a. bleeding.
   b. pruritus.
   c. vaginal discharge.
   d. vaginal odor.
27. This treatment for chlamydia should not be used in pregnancy because it may lead to the discoloration of teeth in children.
   a. Ciprofloxacin
   b. Doxycycline
   c. Penicillin
   d. Trimethoprim
28. A 26-year-old female has a Pap test report of ASC-US. This is her first abnormal Pap test. Recommended first steps in follow-up would include:
   a. colposcopy within the next six months.
   b. co-testing with Pap and HPV tests in one year.
   c. reflex HPV test now.
   d. repeat Pap test alone in three years.
29. A 24-year-old nulliparous female with occasional spontaneous, bilateral milky nipple discharge has no other significant breast findings. She has regular menses and a negative pregnancy test. She takes no medications and denies use of illicit drugs. Her prolactin and TSH levels are normal. An appropriate next step in her management would be:
   a. advise a repeat prolactin level in one year.
   b. order a breast ultrasound.
   c. order an MRI or CT scan of the pituitary gland.
   d. start her on a low-dose dopamine agonist.
30. A 24-year-old woman presents with complaint of nontender mass in her left breast that does not change with the menstrual cycle. On examination, you note a freely movable, 0.5 cm x 1 cm, firm, rubbery nontender mass. The most likely diagnosis is:
   a. fibroadenoma.
   b. fibrocystic breast changes.
   c. intraductal papilloma.
   d. cystosarcoma phylloides.
31. A 34-year-old female has a normal Pap test with positive HPV test. Recommended first steps in follow-up would include:
   a. colposcopy within the next six months.
   b. HPV typing test for HPV 16 and 18 now.
   c. repeat HPV test alone in one year.
   d. repeat Pap and HPV tests in three years.
32. Potential causes for galactorrhea include all of the following except:
   a. heavy tobacco use.
   b. hypothyroidism.
   c. opiate use.
   d. pituitary adenoma.
33. Leiomyomata arising from tissue within the uterine wall are:
   a. interstitial.
   b. pedunculated.
   c. subserosal.
   d. submucosal.
34. The most common presenting symptom of leiomyomata uteri/fibroids is:
   a. heavy or prolonged menses.
   b. gastrointestinal symptoms.
   c. infertility.
   d. urinary frequency.
35. Another name for a dermoid cyst is:
   a. benign cystic teratoma.
   b. follicular cyst.
   c. hyperplastic endometroma.
   d. Mullerian cyst.
36. Your examination of a female patient indicates that she has external genital warts. You will want to explain to her that:
   a. her partner needs a blood test to see if he has subclinical infection.
   b. she should have Pap tests every six months.
   c. there is no therapy that will eliminate the HPV virus.
   d. you cannot start treatment until you have her Pap test results.
37. A 36-year-old is seen in your office on day 18 of her routine annual examination. She has no complaints. Pelvic exam reveals a 9-cm firm pelvic mass anterior to the uterus. The most likely diagnosis is:
   a. benign cystic teratoma.
   b. ectopic pregnancy.
   c. endometrioma.
   d. follicular cyst.
38. The term for the anatomic abnormality in which the a male has a tight foreskin that cannot be retracted is:
   a. hypospadias.
   b. Peyronie's disease.
   c. phimosis.
   d. varicocele.
39. All of the following are risk factors for cancer of the vulva except:
   a. cigarette smoking.
   b. high risk type HPV infection.
   c. lichen sclerosis.
   d. multiparity.
40. The most common presenting symptom of cervical cancer is:
   a. dyspareunia.
   b. lower abdominal pain.
   c. irregular bleeding.
   d. yellow vaginal discharge.
41. A 22-year-old female has a Pap test report of HSIL. Recommended first steps in follow-up would include:
   a. colposcopy.
   b. co-test with Pap and HPV tests in one year.
52. Effective treatment for the symptomatic relief of herpes genitalis is:
   a. ceftriaxone.
   b. famciclovir.
   c. silver nitrate.
   d. tetracycline.

53. A lesion of secondary syphilis is:
   a. condyloma acuminata.
   b. condyloma lata.
   c. molluscum contagiosum.
   d. inguinal bubo.

54. Primary syphilis may be suspected when the patient presents with:
   a. a maculopapular rash.
   b. an indurated, painless ulcer on the cervix.
   c. enlarged, tender inguinal lymph nodes.
   d. tender vesicles and papules on the vulva.

55. Herniation of the bladder into the vagina is called:
   a. cystocele.
   b. enterocoele.
   c. urethrocele.
   d. vaginal prolapse.

56. A 66-year-old woman with a history of pruritus presents with an ulceration of the vulva. The most likely diagnosis is:
   a. chancroid.
   b. secondary trauma.
   c. syphilis.
   d. vulvar carcinoma.

57. A 26-year-old woman presents with multiple, painless, umbilicated papules on her mons pubis. The most likely diagnosis is:
   a. condyloma acuminata.
   b. condyloma lata.
   c. lymphogranuloma venereum.
   d. molluscum contagiosum.

58. Which of the following statements concerning herpes genitalis is true?
   a. Suppressive therapy does not reduce viral shedding.
   b. Systemic symptoms are uncommon during recurrences.
   c. Topical acyclovir is as effective as oral acyclovir for recurrences.
   d. Transmission of the virus is unlikely to occur during the prodromal phase.

59. Disorders of pelvic support may be associated with all of the following except:
   a. obesity.
   b. neuromuscular injury during childbirth.
   c. pelvic surgery.
   d. frequent urinary tract infections.

60. A 58-year-old woman complains that she feels like she is “sitting on a ball.” She has significant constipation and rectal pressure. On examination you will most likely find:
   a. cystocele.
   b. hemorrhoid.
   c. rectocele.
   d. urethrocele.

61. Vaginal cancer is most commonly found in which part of the vagina?
   a. The hymenal ring
   b. Midway of the vagina
   c. The posterior fourchette
   d. The upper one-third of the vagina
62. Females exposed to DES in utero are at increased risk for:
   a. breast cancer.
   b. ovarian cancer.
   c. vaginal cancer.
   d. vulvar cancer.

63. Anticholinergic agents may be used in the treatment of:
   a. stress incontinence.
   b. urge incontinence.
   c. vestibulitis.
   d. vulvodynia.

64. The test/procedure used in an infertility workup to help determine ovarian reserve is:
   a. anti-Müllerian hormone level.
   b. basal body temperature charting.
   c. FSH and LH levels.
   d. hysterosalpinogram.

65. The most common cause of pathologic nipple discharge in postmenopausal women is:
   a. breast cancer.
   b. fibroadenoma.
   c. intraductal papilloma.
   d. prolactin-secreting pituitary adenoma.

66. Mutations in BRCA1 and/or BRCA2 genes are responsible for approximately what percentage of female breast cancers?
   a. Less than 5 percent
   b. Five to 10 percent
   c. Fifteen to 20 percent
   d. More than 20 percent

67. An examination finding that is considered a minimum criterion for empirical treatment of PID in a sexually active young woman presenting with lower abdominal or pelvic pain is:
   a. adnexal mass.
   b. cervical motion tenderness.
   c. fever higher than 101°F (> 38.4°C).
   d. vaginal discharge.

68. A 16-year-old patient comes to the office because she has never had a menstrual period. She has normal breast development, scant pubic hair, and a blind vaginal pouch with no palpable uterus or ovaries. The most likely diagnosis is:
   a. androgen insensitivity/resistance syndrome.
   b. Müllerian agenesis.
   c. Sheehan's syndrome.
   d. Turner's syndrome.

69. The gonads should be removed after puberty in a person with androgen insensitivity/resistance syndrome to prevent:
   a. endometrial hyperplasia.
   b. gonadal malignancies.
   c. increased risk for breast cancer.
   d. psychological trauma.

70. The most common method of assisted reproductive technology is:
   a. gamete intrafallopian transfer (GIFT).
   b. intracytoplasmic sperm injection (ICSI).
   c. in vitro fertilization (IVF).
   d. zygote intrafallopian transfer (ZIFT).

71. Turner's syndrome can be suspected when the patient has primary amenorrhea and:
   a. blind vaginal pouch with imperforate hymen.
   b. low IQ and visual disturbances.
   c. normal breast development but lack of pubic and axillary hair growth.
   d. short stature and webbed neck.

72. The most common chromosomal abnormality in spontaneously aborted fetuses is:
   a. Fitz-Hugh-Curtis syndrome.
   b. fragile X syndrome.
   c. Müllerian duct abnormalities.
   d. Turner's syndrome.

73. Which of the following statements concerning ovarian cancer is true?
   a. BRCA1 gene mutations increase risk but BRCA2 gene mutations do not.
   b. Lifetime risk in the general population is 1–2%.
   c. Ovarian cancer rates are highest among women age 30 to 45 years.
   d. Use of oral contraceptives for more than five years increases risk.

74. A patient with latent syphilis may present with:
   a. a maculopapular rash.
   b. an indurated painless ulcer.
   c. condyloma lata.
   d. no signs of infection.

75. The CDC recommendation for follow-up of a female treated for PID with a recommended outpatient regimen is:
   a. advise patient to return if pain and/or fever persists more than five days.
   b. reexamine patient within 72 hours after initiation of treatment.
   c. retest for chlamydia and gonorrhea in two weeks.
   d. see patient in one week for second dose of ceftriaxone IM.

76. Which of the following medications is most likely to cause a metallic taste?
   a. Acyclovir
   b. Azithromycin
   c. Fluconazole
   d. Metronidazole

77. A patient-applied treatment for genital warts is:
   a. bichloracetic acid.
   b. clindamycin cream.
   c. imiquimod.
   d. podophyllin resin.

78. A 45-year-old female presents with complaint of lower abdominal pain with urinary urgency and frequency for the past three months. The pain is worse during sexual intercourse and relieved somewhat when she urinates. Physical exam reveals suprapubic tenderness as well as tenderness along the anterior vaginal wall and urethra. The remainder of her exam is normal. What diagnosis best fits these findings?
   a. Chronic urinary tract infection
   b. Interstitial cystitis/painful bladder syndrome
   c. Pelvic inflammatory disease
   d. Pyelonephritis

79. Characteristic “strawberry spots” on the cervix may be seen with:
   a. bacterial vaginosis.
   b. chlamydia.
   c. herpes genitalis.
   d. trichomoniasis.

80. Typical characteristics of vulvodynia include:
   a. constant vulvar burning and discomfort.
   b. inflammation of the vestibular glands.
   c. thickened plaques on the vulva.
   d. vulvovaginal edema and erythema.
Answers with Rationales

1. b. the luteal phase.
   Premenstrual syndrome is the cyclic occurrence of a group of distressing physical and psychological symptoms in the luteal phase that begins about five to seven days before menses and resolves within about four days after onset of menses.

2. c. prostaglandin inhibitors.
   Prostaglandin synthetase inhibitors, nonsteroidal anti-inflammatory drugs (NSAIDs), are the treatment of choice for primary dysmenorrhea. They work best if they are begun at the onset of menses and are continued for 48 to 72 hours. Choices shown to be effective are mefenamic acid, naproxen sodium, ibuprofen, and indomethacin.

3. b. endometriosis.
   Seven to 10% of premenopausal women are affected by endometriosis; it is the most common cause of chronic pelvic pain.

4. d. Sub Q 104 DMPA
   Sub Q 104 DMPA is FDA approved for treatment of endometriosis. Other medical management includes analgesics (nonsteroidal anti-inflammatory drugs are first choice), gonadotropin-releasing hormone (GnRH) agonists, and danazol to induce regression of endometrial implants; IM DMPA has also been found to be effective.

5. c. infertility.
   Twenty-five percent of cases of PID result in infertility, ectopic pregnancy, or chronic pelvic pain.

6. a. detrusor irritability.
   Urge urinary incontinence is an involuntary loss of urine preceded by a sudden, strong urge to urinate. It is most often associated with overactivity of the detrusor muscle, causing inappropriate contraction during bladder filling.

7. b. cystocele.
   Cystocele is the herniation of the bladder into the vaginal lumen.

8. b. laparoscopy.
   Direct visualization with laparoscopy or laparotomy reveals classic implants with endometriosis, classified as Stage I—minimal, Stage II—mild, Stage III—moderate, and Stage IV—severe.

9. a. boggy, tender uterus.
   Physical findings with adenomyosis include boggy, tender uterus and diffuse, globular enlargement—may be 8 to 10 weeks’ size and may see evidence of anemia.

10. d. polyp.
    Polyps are the most common benign neoplasm of the cervix. They are seen most often in perimenopausal and multigravida women between the ages of 30 and 50 years.

11. d. trichomonads.
    Symptoms of trichomoniasis include copious, malodorous, yellowish-green discharge; vulvar irritation; pruritus; and occasionally dysuria, urgency, frequency of urination, postcoital and intermenstrual bleeding. Onset of symptoms often occurs after menses. In addition to vaginal discharge, physical examination findings may include erythema and edema of the vagina, friable cervix, and punctate lesions (strawberry spots) on the surface of the cervix.

12. c. uterus present, ovaries absent.
    Physical characteristics found in persons with Turner’s syndrome include lack of breast development, scant pubic hair, normal uterus and vagina, absent or streak ovaries, short stature, webbed neck, and shield chest with widely spaced nipples. Cardiac and renal anomalies may also be present.

13. a. lichen sclerosus.
   Lichen sclerosus is a chronic, progressive inflammatory skin condition primarily affecting the perineal and perianal areas. Symptoms include pruritus, dysuria, and dyspareunia. Physical examination findings include maculopapular lesions and plaques; loss of pigmentation; markedly thin, white epidermis; loss of vulvar architecture with obliteration of the clitoris; and introital stenosis. There is symmetry in the distribution of skin changes extending around the anal region (figure of eight).

14. d. cryotherapy with liquid nitrogen.
   Molluscum contagiosum usually resolves spontaneously without scarring. Treatment options include superficial incision, expressing contents with a comedo extractor, curettage with cautery; and cryotherapy with liquid nitrogen (most often used if the patient has multiple lesions).

15. a. Acts as an antifibrinolytic agent to block lysis of fibrin clots
   Tranexamic acid is effective in blocking lysis of fibrin clots and, when taken up to the first five days of menses, reduces heavy menstrual bleeding in women who have increased endometrial plasminogen activity.

16. c. polycystic ovarian syndrome.
   Physical findings related to endogenous excess with polycystic ovarian syndrome may include acne, hirsutism, male pattern baldness, deepening of voice, enlargement of clitoris.

17. a. administer a progestin challenge test.
   To evaluate an amenorrheic patient, obtain a pregnancy test, serum prolactin level, and thyroid-stimulating hormone (TSH) test. If all these tests are negative or normal, evaluate the availability of estrogen with a progestin challenge test. Provide oral progestin each day for 10 to 14 days, then wait for bleeding, which should occur within 7 to 14 days. A positive progestin challenge test indicates adequate estrogen production and stimulation as well as no problem with outflow tract.

18. c. single-dose oral nitrofurantoin after sexual intercourse.
   Women who experience symptoms of recurrent UTI/cystitis after sexual intercourse may benefit from a prophylactic regimen of single-dose oral nitrofurantoin after sex. Recommended medications used for six-month prophylactic regimens include TMP/SMX, trimethoprim, nitrofurantoin, cefaclor, and cephalaxin. Vaginal but not oral estrogen therapy may be considered for postmenopausal women with vaginal atrophy/genital syndrome of menopause. Spermicides and diaphragms should be avoided.

19. c. colicky, spasmodic, sometimes radiating to the thighs and low back.
   Primary dysmenorrhea is characterized by pain that begins shortly before the onset of menses and usually lasts no longer than two days. The pain is described as colicky, crampy, and spasmodic in the lower abdomen that sometimes radiates to the lower back and thighs. There is no associated underlying pathology.

20. c. primary amenorrhea.
    Primary amenorrhea is characterized by no menstruation by age 14 in the absence of secondary sex characteristics or by age 16 regardless of development of secondary sex characteristics.
21. c. LH surge test
Ovulation prediction tests detect LH in the urine. A surge of LH precedes ovulation. LH can be detected in the urine a few hours after the surge and within 24 to 26 hours of ovulation.

22. d. macular rash on face and trunk.
Toxic shock syndrome (TSS) is characterized by sudden-onset fever of 102°F or greater and a diffuse macular sunburnlike rash over the face, trunk, and extremities that desquamates one to two weeks after onset.

23. c. Specific suggestions
The PLISSIT model (P = permission giving, LI = limited information, SS = specific suggestions, IT = intensive therapy) may be used by clinicians who are not sex therapists when counseling patients with sexual dysfunction. Instructing a couple on the use of water-soluble lubrication for dyspareunia caused by vagina dryness constitutes a specific suggestion.

24. e. endometrial cancer.
Women with polycystic ovarian syndrome are at risk for future development of endometrial cancer related to chronic anovulation and unopposed estrogen.

25. c. Polycystic ovarian syndrome
A positive progestin challenge test indicates the woman who is not having menses does have an adequate production of estrogen, is able to develop a proliferative endometrium, and has an unobstructed outflow tract.

26. b. pruritus.
Symptoms associated with vulvar cancer include vulvar pruritus (most common), pain, burning, bleeding, odorous discharge that may be blood tinged, and lesions.

27. b. Doxycycline
Doxycycline should not be used in pregnancy because it may cause discoloration of teeth in children.

28. c. reflex HPV test now.
The ASCCP-preferred follow-up of a 26-year-old female with a Pap test report of ASC-US and no previous abnormal Pap test is to obtain a reflex HPV test. If it is negative, repeat the Pap test in three years; if it is positive, perform colposcopy. ASCCP indicates it is also acceptable to repeat the Pap test in 12 months.

29. a. advise a repeat prolactin level in one year.
The woman with galactorrhea who is having regular menses and has normal prolactin and TSH levels may be followed with yearly prolactin levels.

30. a. Fibroadenoma.
Fibroadenomas are firm, well-delineated, freely movable, smooth, rubbery, round, typically marble-sized, nontender masses and they are usually unilateral.

31. b. HPV typing test for HPV 16 and 18 now.
The ASCCP provides two acceptable follow-up strategies for a 34-year-old female who has a normal Pap test with positive HPV test. One strategy is to obtain an HPV typing test for HPV 16 and 18; if positive for HPV 16 or 18, perform colposcopy. Another strategy is to repeat co-testing in 12 months; if either HPV positive or Pap is ≥ ASC-US, perform colposcopy. Normal findings for either strategy should be followed with co-testing in three years.

32. a. heavy tobacco use.
Potential causes for galactorrhea include hypo-/hyperthyroidism, use of some medications, use of opiates or cannabis, excessive breast stimulation, and pituitary adenoma.

33. a. interstitial.
Leiomyomata can be found in different areas within and around the uterine cavity and surrounding ligaments. Submucosal myomas protrude into the uterine cavity. Subserosal myomas bulge through the outer uterine wall. Intraligamentous myomas are found within the broad ligament. Interstitial (intramural) myomas stay within the uterine wall; they are the most common form of myoma. Pedunculated myomas are on a thin pedicle or stalk attached to the uterus.

34. a. heavy or prolonged menstrual bleeding
Patients with leiomyomata/fibroids are usually asymptomatic. If they do have symptoms, heavy or prolonged menstrual bleeding is the most common presentation.

35. a. benign cystic teratoma.
A dermoid cyst is also known as a benign cystic teratoma. It is the most common ovarian germ cell tumor.

36. c. there is no therapy that will eliminate the HPV virus.
The goal of treatment for genital warts is to eliminate visible lesions; however, there is no therapy that will completely eliminate the HPV virus.

37. a. benign cystic teratoma.
Benign cystic teratomas usually measure between 5 and 10 cm in diameter and they are composed of well-differentiated tissue from all three germ layers. They are often located anterior to the uterus. Patients are usually asymptomatic but may experience acute pain if the teratoma twists or ruptures.

38. c. phimosis.
The term for the anatomic abnormality in which a male has a tight foreskin that cannot be retracted is phimosis. Phimosis may be congenital or the result of recurrent infections of the glans penis and prepuce, and may contribute to male infertility.

39. d. multiparity.
Risk factors for vulvar cancer included high risk type HPV infection, lichen sclerosis, and cigarette smoking.

40. c. irregular bleeding.
Early in the disease process, women with cervical carcinoma may be asymptomatic. The most common presenting symptom of advanced cervical cancer is irregular, painless bleeding or odorous bloody or purulent discharge. Late symptoms include pelvic or epigastric pain or urinary or rectal symptoms.

41. a. colposcopy
The ASCCP recommendation for follow-up of an HSIL Pap test result in women age 21 to 24 is colposcopy.

42. d. ovarian cancer.
Early signs of ovarian carcinoma include abdominal discomfort or pain, pressure sensation on the bladder or rectum, pelvic fullness or bloating, and vague gastrointestinal symptoms.

43. c. obesity.
Risk factors for endometrial carcinoma include diabetes, obesity, hypertension, family history, early menarche, late menopause, unopposed estrogen therapy, oligo-ovulation, anovulation, and estrogen-secreting tumors (granulosa cell).

44. d. ovarian carcinoma.
The mortality rate from ovarian carcinoma exceeds all other genital tract malignancies.

45. b. bacterial vaginosis.
A positive “whiff” test is the fishy odor that may be found when 10% KOH is added to a vaginal discharge sample of a patient with bacterial
vaginosis. The whiff test is part of Amsel's criteria for diagnosing bacterial vaginosis, along with vaginal pH ≥ 4.5, clue cells on saline wet mount, and homogeneous white discharge coating the vaginal wall.

46. a. elevated pH.
   Loss of lactobacilli (hydrogen peroxide–producing strains) in the vagina results in an elevated pH. An elevated pH may predispose a woman to bacterial vaginosis.

47. b. oral metronidazole.
   For the treatment of trichomoniasis, the CDC recommends metronidazole 2 g orally in a single dose.

48. d. Trichloracetic acid
   For the treatment of genital warts in pregnancy, the CDC recommends trichloracetic or bichloracetic acid (80–90% solution). Imiquimod cream, podophyllin resin, and podofilox gel should not be used during pregnancy.

49. b. chlamydia.
   Symptoms of chlamydia may include postcoital bleeding; intermenstrual bleeding or spotting; symptoms of urinary tract infection—dysuria, frequency; vaginal discharge; and abdominal pain. Physical findings may include mucopurulent endocervical discharge; edematous, tender cervix with easily induced bleeding; slight tenderness upon palpation of suprapubic area.

50. b. late menopause.
   Risk factors for ovarian carcinoma include low parity; early menarche; late menopause; and history of breast, colon, or endometrial cancer.

51. d. test for possible reinfection three months after treatment.
   A test of cure is not recommended for nonpregnant women after treatment for chlamydia with a CDC-recommended regimen. A majority of post-treatment infections are reinfection. The CDC recommends retesting the patient three months’ post-treatment.

52. b. famciclovir.
   Acyclovir, fumarcticlovir, and valacyclovir are systemic antiviral drugs that partially control symptoms of herpes genitalis. These medications do not eradicate latent virus nor affect the risk, recurrence, frequency, or severity of symptoms once the drug is discontinued; suppressive therapy may reduce viral shedding.

53. b. condyloma lata.
   Patients with secondary syphilis may present with localized or diffuse mucocutaneous lesions on the palms and soles, mucous patches, and condyloma lata. They may also have generalized lymphadenopathy along with flulike symptoms (low-grade fever, headache, sore throat, malaise, arthralgias).

54. b. an indurated, painless ulcer on the cervix.
   Primary syphilis should be suspected if a person presents with a painless, ulcerated lesion with raised border; indurated base; and rolled edges on the vulva, vagina, cervix, penis, or other site of potential entry of the syphilis organism. The primary syphilis lesion spontaneously disappears in one to six weeks.

55. a. rectocele.
   A rectocele is the herniation of the bladder into the anterior vaginal wall.

56. d. vulvar carcinoma.
   The most common signs and symptoms of vulvar carcinoma include pruritus (most common); pain; burning; bleeding lesions that may be darkly or irregularly pigmented, white or red, multifocal or singular, and flat, wartlike, or scaly; erythematous irritated ulceration; and odorous discharge that may be blood-tinged.

57. d. molluscum contagiosum.
   Molluscum contagiosum presents with characteristic light-colored papules with umbilicated centers on the trunk, lower extremities, abdomen, inner thigh, or genital area.

58. b. Systemic symptoms are uncommon during recurrences.
   A recurrent genital herpes infection usually takes on a milder course and does not present with systemic symptoms such as fever, malaise, and headache.

59. d. frequent urinary tract infections.
   Disorders of pelvic support result from weakness in supporting structures that include the pelvic diaphragm, ligaments, and fascia. Causes include neuromuscular injury at childbirth, resulting in denervation injury of the muscular floor as well as conditions that cause chronic increase in abdominal pressure—obesity, straining, chronic lung disease (coughing); nerve function altered by diabetes, pelvic surgery, neurologic disorders; and hypoestrogenism.

60. c. rectocele.
   A rectocele typically presents as a bulging or herniation of the anterior rectal wall and posterior vaginal wall into the opening of the vagina. Constipation, rectal pressure, and a sensation of "sitting on a ball" are symptoms that may occur with a significant rectocele.

61. d. The upper one-third of the vagina.
   The most common site of vaginal carcinoma is the upper one-third of the vagina.

62. c. vaginal cancer.
   Females exposed to diethylstilbestrol (DES) in utero are at increased risk for clear cell carcinoma of the vagina (although rarely; the risk is 1 in 1,000).

63. b. urge incontinence.
   Management/treatment of urge incontinence includes bladder retraining with scheduled voiding, biofeedback. Kegel exercises, avoidance of bladder irritants, and use of anticholinergic agents (oxybutynin chloride, tolterodine tartrate).

64. a. anti-Müllerian hormone level.
   The test commonly used in an infertility workup to determine a woman’s ovarian reserve is an anti-Müllerian hormone level.

65. c. intraductal papilloma.
   An intraductal papilloma is a benign lesion of the lactiferous duct found most commonly in the perimenopausal age group, 35–50 years old. It is the most common cause of pathologic nipple discharge.

66. b. Five to 10 percent
   Mutations in BRCA1 and/or BRCA2 genes are responsible for approximately 5–10% percent of female breast cancers.

67. b. cervical motion tenderness.
   Minimum criterion for empiric treatment of PID in sexually active young women and other women at risk for STIs with complaint of pelvic or lower abdominal pain includes the presence of one or more of these three findings on pelvic examination: uterine tenderness, adnexa tenderness, cervical motion tenderness.

68. a. androgen insensitivity/resistance syndrome.
   Androgen insensitivity/resistance syndrome is a genetically transmitted androgen receptor defect. The individual is genotypic male (46XY) but phenotypic female or has both female and male characteristics. The individual has normally developed breasts with small nipples and areola, scanty or absent pubic hair, a blind vaginal pouch, and no uterus or ovaries. Testes are present and may be partially descended or intra-abdominal.
69. b. gonadal malignancies.

Once full development is attained (after puberty) in a person with androgen insensitivity syndrome, gonads should be removed at about age 16 to 18 years to reduce risk of malignant transformation of the gonads (5%). Incidence of malignancy is rare before puberty.

70. c. in vitro fertilization (IVF).

In vitro fertilization is the most common assisted reproductive technology, with a success rate of 15–20%. IVF is a series of complex procedures wherein the oocytes are extracted, fertilized in the laboratory, and then transferred through the cervix into the uterus.

71. d. short stature and webbed neck.

Individuals with Turner's syndrome phenotypically present with short stature, webbed neck, shield chest with widely spaced nipples, increased carrying angle of elbow, arched palate, low neck hairline, short fourth metacarpal bones, disproportionately short legs, swolen hands and feet, lack of breast development, and scant pubic hair.

72. d. Turner's syndrome.

Turner's syndrome (45X) is the most common chromosomal abnormality found on spontaneous abortuses.

73. b. Lifetime risk in the general population is 1–2%.

The lifetime risk for ovarian cancer in the general population is 1–2%. The presence of BRCA1 or BRCA2 gene mutations increases the risk. The use of oral combination hormonal contraceptives for more than five years decreases the risk.

74. d. no signs of infection.

Patients with latent syphilis show no signs of infection; detection is through serologic testing.

75. b. reexamine patient within 72 hours after initiation of treatment.

After treatment for pelvic inflammatory disease (PID), follow-up and reexamination within 72 hours post-treatment are recommended. If the patient is not significantly improved, review the diagnosis and treatment; the patient may need hospitalization.

76. d. Metronidazole

Side effects of metronidazole include metallic taste, nausea, headache, dry mouth, and dark-colored urine.

77. c. imiquimod.

Patient-applied treatments for genital warts include imiquimod cream, podofilox gel or solution, and sinecatechins ointment.

78. b. Interstitial cystitis/painful bladder syndrome

Interstitial cystitis/painful bladder syndrome is defined as an unpleasant sensation (pain, pressure, discomfort) perceived to be related to the urinary bladder; it is associated with lower urinary tract symptoms, greater than six weeks’ duration, with absence of infection. The woman may have lower abdominal pain that is worse during sexual intercourse and relieved somewhat when she urinates.

Physical examination findings may include suprapubic tenderness as well as tenderness along the anterior vaginal wall and urethra.

79. d. trichomoniasis.

A classic (although not always present) examination finding with trichomoniasis is punctate red lesions on the cervix often called strawberry spots.

80. a. constant vulvar burning and discomfort.

Vulvodynia is defined as chronic vulvar discomfort, often described as burning pain, occurring in the absence of relevant physical findings or a specific clinically identifiable neurologic disorder. Symptoms may be generalized involving the mons pubis, labia majora, labia minora, and perineum or localized (vestibulodynia) to the vestibule and clitoris.

Bibliography


Human Reproduction and Fertilization

- Process of gametogenesis
  1. Definition—development of gametes; oogenesis or spermatogenesis
  2. Essential concepts
     a. Oogenesis—developmental process by which the mature human ovum is formed; haploid number of chromosomes
     b. Spermatogenesis—formation of mature functional spermatozoa; haploid number of chromosomes
     c. Meiosis—a process of two successive cell divisions, producing cells, egg, or sperm, that contain half the number of chromosomes found in somatic cells
     d. Mitosis—type of cell division of somatic cells in which each daughter cell contains the same number of chromosomes as the parent cell
     e. Haploid number of chromosomes 23—possessing half the diploid or normal number of chromosomes, that is, 46, as found in somatic or body cells

- Process of fertilization
  1. Definition—union of ovum and spermatozoan; usually occurs in fallopian tube within minutes or no more than a few hours of ovulation; most pregnancies occur when intercourse occurs within two days of ovulation
  2. Stages of development
     a. Zygote—a diploid cell with 46 chromosomes that results from the fertilization of the ovum by a spermatozoan
     b. Blastomeres—mitotic division of the zygote (cleavage) yields daughter cells called blastomeres
     c. Morula—the solid ball of cells formed by 16 or so blastomeres; mulberry-like ball of cells that enters the uterine cavity three days after fertilization
     d. Blastocyst—after the morula reaches the uterus, a fluid accumulates between blastomeres, converting the morula to a blastocyst; inner cell mass at one pole to become embryo; outer cell mass will be trophoblast
     e. Embryo—stage in prenatal development between the fertilized ovum and the fetus (i.e., between second and eighth weeks inclusive)
     f. Fetus—the developing conceptus after the embryonic stage
     g. Conceptus—all tissue products of conception: embryo (fetus), fetal membranes, and placenta

- Physiology of implantation of the blastocyst
  1. Definition—blastocyst adheres to the endometrial epithelium by gently eroding between the epithelial cells of the surface endometrium; invading trophoblasts burrow into the endometrium; the blastocyst becomes encased and covered over by the endometrium
  2. Implantation occurs six to seven days after fertilization and usually in the upper, posterior wall of the uterus
  3. Provides physiologic exchange between the maternal and embryonic environment prior to full placental function

Development of the Placenta, Membranes, and Amniotic Fluid

- Essential concepts
  1. Chorion—an extra-embryonic membrane that, in early development, forms the outer wall of the blastocyst; from it develops the chorionic villi, which establish an intimate connection with the endometrium, thus giving rise to the placenta
  2. Chorion frondosum—the outer surface of the chorion whose villi contact the decidua basalis; the placental portion of the chorion
  3. Chorion laeve—the smooth, nonvillous portion of the chorion
  4. Syncytiotrophoblast—outer layer of cells covering the chorionic villi of the placenta that are in contact with the maternal blood or decidua
  5. Cytotrophoblast—thin inner layer of the trophoblast composed of cuboidal cells
  6. Decidua capsularis—the part of the decidua that surrounds the chorionic sac
7. Decidua basalis—the part of the uterine decidua that unites with the chorion to form the placenta
8. Decidua parietalis (vera)—the endometrium during pregnancy, except at the site of the implanted blastocyst
9. Amnion—the innermost fetal membrane; a thin, transparent sac that holds the fetus suspended in the liquor amnii, or amniotic fluid; it grows rapidly at the expense of the extraembryonic coelom and, by the end of the third month, it fuses with the chorion, forming the amniochorionic sac, commonly called the bag of waters

- Placenta—serves as fetal lungs, liver, and kidneys until birth, while growing and maintaining the conceptus in a balanced, healthy environment

1. Anatomy
   a. Trophoblasts
   b. Chorionic villi
   c. Intervillous spaces
   d. Chorion
   e. Amnion
   f. Decidual plate

2. Steroid and protein hormones—human trophoblasts produce more diverse steroid and protein hormones and in greater amounts than any endocrine tissue in all of mammalian physiology
   a. Steroid hormones
      (1) Estradiol-17B—responsible for the growth of the uterus, fallopian tubes, vagina, and breast development
      (2) Estriol—an estrogen metabolite excreted by the placenta during pregnancy that is found in the urine of pregnant women
      (3) Progesterone—secreted by the corpus luteum; essential in preparing the uterus for implantation of the fertilized ovum and maintaining the pregnancy
      (4) Aldosterone—responsible for regulation of the body’s salt and water balance
      (5) Cortisol—plays a role in the metabolism of fats, glucose, and proteins
   b. Protein and peptide hormones
      (1) Placental lactogen (hPL/HPL)—placental hormone that inhibits maternal insulin activity during pregnancy; decreases to undetectable levels soon after delivery of the placenta
      (2) Chorionic gonadotropin (hCG)—hormone secreted by the placenta to help maintain corpus luteum function and production of progesterone; levels found in serum and urine assays of pregnant women as early as a week after conception
      (3) Placental adrenocorticotropic hormone (ACTH)—the role of this hormone is related to the regulation of the secretion of gluco糖corticoids
      (4) Pro-opiomelanocortin—a precursor polypeptide
      (5) Chorionic thyrotropin—a type of hormone similar to thyroid-stimulating hormone (TSH) that has the ability to increase metabolism
      (6) Growth hormone variant—hormone plays a vital role in growth control

   c. Hypothalamic-like releasing and inhibiting hormones
      (1) Thyrotropin-releasing hormone (TRH)—responsible for the regulation of TSH
      (2) Gonadotropin-releasing hormone (GnRH)—essential in controlling the secretion of luteinizing hormone (LH) and follicle-stimulating hormone (FSH)
      (3) Corticotropin-releasing hormone (CRH)—works with vasopressin hormone to regulate the release of ACTH
      (4) Somatostatin—responsible for inhibiting the release of growth hormone, prolactin, and thyrotropin

   d. Regulation of blood flow in the placenta; maternal blood traverses the placenta randomly without preformed channels and enters the intervillous spaces in spurts propelled by the maternal arterial pressure

   e. The placental “barrier”—the placenta does not maintain absolute integrity between maternal and fetal circulations as indicated by the presence of fetal blood cells in maternal circulation and the development of erythroblastosis fetalis

   f. Oxygen and glucose are transported across the placenta via facilitated diffusion

- Umbilical cord

1. Anatomy
   a. Vessels—two arteries that carry fetal deoxygenated blood to the placenta, smaller in diameter than the vein; and one vein carrying oxygenated blood from the placenta to the fetus
   b. Measurements—0.8–2 cm in diameter; average length of 55 cm with range of 30–100 cm
   c. Wharton’s jelly—extracellular matrix consisting of specialized connective tissue that serves as protection for the umbilical cord

2. Abnormalities of length—positively influenced by amniotic fluid volume (AFV) and fetal mobility
   a. Extremely short cord—associated with abruptio placentae or uterine inversion; the latter is rare
   b. Abnormally long cord—associated with vascular occlusion by thrombi and true knots

- Amniotic fluid

1. Production—produced by amniotic epithelium; water transfers across amnion and through fetal skin; in second trimester fetus starts to swallow, urinate, and inspire amniotic fluid

2. Volume maintenance—fetal swallowing seems to be a critical mechanism affecting fluid volume because polyhydramnios is consistently present when fetal swallowing is inhibited, but other factors, such as tracheoesophageal atresia, contribute to volume balance

3. Polyhydramnios (also termed hydramnios)—an excess of amniotic fluid; amniotic fluid index (AFI) greater than or equal to 24 cm or a maximum deepest vertical pocket of equal to or greater than 8 cm (ACOG, 2016b)
   a. Incidence—about 1% of all pregnancies
b. Etiology—50–60% are idiopathic; also associated with fetal anomalies, fetal infection, twin-to-twin transfusion syndrome, maternal diabetes (gestational and pregestational), isoimmunization, or multiple gestations

c. Signs and symptoms—uterine size larger than expected for gestational age (GA), difficulty auscultating fetal heart rate (FHR) and palpating fetal parts, mechanical pressure exerted by the large uterus (i.e., dyspnea, edema, heartburn, nausea)

d. Diagnosis
(1) Physical findings—a fundal height measurement that is 3–4 cm greater than the normal height warrants an ultrasound to determine reason for enlarged uterus; palpation of fetal parts and auscultation of fetal heart beat may be difficult

(2) Ultrasonography (USG)—an AFI measurement of ≥ 24 cm confirms polyhydramnios diagnosis; USG may also identify associated fetal anomalies

e. Pregnancy outcome—hydramnios has been linked to fetal macrosomia; the greater the polyhydramnios, the higher the perinatal mortality; preterm labor increases; risk for postpartum hemorrhage (PPH) is higher given that the uterus is enlarged; increased risk for cord prolapse with rupture of membranes; also associated with erythroblastosis

f. Management—treat only if symptomatic and if benefits outweigh risks; monitor with serial NST and BPP, typically starting at 34 weeks

(1) Amniocentesis—to reduce fluid volume if polyhydramnios is severe (AFI > 35 cm); amniotic fluid can be tested for fetal lung maturity and can also be sent for chromosomal studies

(2) Indomethacin—impairs production of lung liquid, increases fluid movement through fetal membranes, or decreases fetal urine production

4. Oligohydramnios—decreased AFV, defined as an AFI of 5 cm or less or a maximum deepest vertical pocket of fluid measuring less than 2 cm

a. Conditions associated with oligohydramnios

(1) Fetal—almost always present with fetal urinary tract obstruction or renal agenesis

(a) Chromosomal abnormalities

(b) Congenital anomalies

(c) Growth restriction

(d) Demise

(e) Post-term pregnancy

(f) Ruptured membranes; premature rupture of membranes (PROM)

(2) Placental

(a) Abruption

(b) Twin-to-twin transfusion syndrome

(3) Maternal

(a) Uteroplacental insufficiency

(b) Hypertensive disorders (chronic, gestational, superimposed)

(c) Diabetes

(4) Drugs

(a) Prostaglandin synthesis inhibitors

(b) Angiotensin-converting enzyme inhibitors

(5) Idiopathic

b. Prognosis

(1) Early-onset diabetes has poor outcome, and risk of pulmonary hypoplasia is greatly increased; if due to early PROM, risk of stillbirth increased

(2) Late pregnancy onset leads to more cesarean sections for fetal distress

c. Management

(1) Sonographic evaluation for fetal anomalies and growth restriction

(2) Amnioinfusion in the intrapartum period for the treatment of repetitive variable decelerations

### Embryonic and Fetal Development

- Embryonic development—the period of organogenesis, which begins in the third week after fertilization and spans for eight weeks; this is around the time a woman may miss her next menstrual period and when pregnancy tests would turn positive by detecting human chorionic gonadotropin (hCG). However, serum and urine assays can detect hCG as early as a week after conception

1. Fourth week—partitioning of heart begins; arm and leg buds form; amnion begins to unsheath the body stalk that becomes the umbilical cord

2. Sixth week—head is much larger than body; heart is completely formed; fingers and toes present

3. All major organ systems are formed except for lungs

- Fetal development—begins eight weeks after fertilization; 10 weeks after onset of last menstrual period (LMP)

1. Twelve weeks—uterus palpable at the symphysis; fetus begins to make spontaneous movements

2. Sixteen weeks—experienced observers can determine sex on ultrasound

3. Twenty weeks—weighs 300 g; weight now begins to increase in a linear manner

4. Twenty-four weeks—weighs 630 g; fat deposition begins; terminal sacs in the lungs still not completely formed

5. Twenty-eight weeks—weighs 1,100 g; papillary membrane has just disappeared from the eyes; has 90% chance of survival if otherwise normal

6. Thirty-two to thirty-six weeks—continues to increase weight as more subcutaneous fat accumulates

### Diagnosis and Dating of Pregnancy

- Diagnosis

1. Signs of pregnancy

   a. Presumptive—subjective (what the woman reports)

      (1) Amenorrhea

      (2) Nausea and/or vomiting

      (3) Urinary frequency; nocturia

      (4) Fatigue

      (5) Breast tenderness, tingling, enlargement, and changes in color
Head circumference (HC)
Abdominal circumference (AC)
Femur length (FL)
b. Accuracy by trimester
(1) First trimester—CRL is accurate to three to five days
(2) Second trimester—BPD and FL are most accurate within 7–10 days
(3) Third trimester—after 26 weeks, all measurements are less accurate; variation in BPD and FL is 14–21 days

Maternal Physiologic Adaptations to Pregnancy
• Effects of pregnancy on the organs of reproduction and implications for clinical practice
1. Uterus
   a. Nonpregnant uterus is about 70 g with a 10-mL cavity
   b. First trimester—at six weeks the uterus is soft, globular, and asymmetric (Piskacek’s sign); at 12 weeks, it is 8–10 cm and is rising out of the pelvis
   c. Early second trimester—at 14 weeks, the uterus is one-quarter of the way to umbilicus; at 16 weeks, it is halfway to the umbilicus; at 20 weeks the fundus is approximately at the umbilicus
   d. After 20 weeks, number of centimeters with tape measure equals number of weeks of gestation within 2 cm
   e. By term, the uterus weighs about 1,100 g with a 5-liter volume
2. Cervix
   a. Develops increased vascularity
   b. Hegar’s sign is softening of the isthmus
   c. Chadwick’s sign is bluish color of the cervix
   d. Goodell’s sign is softening of the cervix
   e. A thick mucus plug forms secondary to glandular proliferation
3. Ovaries—corpus luteum
   a. Anovulation secondary to hormonal interruption of the feedback loop
   b. Corpus luteum persists under the influence of the hormone hCG until about 12 weeks
   c. Corpus luteum is responsible for the secretion of progesterone to maintain the endometrium and pregnancy until the placenta takes over production
   d. Ovaries also thought responsible for production of relaxin
4. Vagina
   a. Chadwick’s sign—bluish color
   b. Thickening of vaginal mucosa
   c. Increase in vaginal secretions
   d. Some loosening of connective tissue in preparation for birth
5. Breasts
   a. Increase in size secondary to mammary hyperplasia
   b. Areola becomes more deeply pigmented and increases in size
   c. Colostrum may be expressed after the first several months of pregnancy
   d. Montgomery’s follicles
   e. Vascularity increases
6. Pelvis—four pelvic types
   a. Anthropoid
      (1) 23.5% of white women and 50% of nonwhite women
      (2) Shape favors a posterior position of the fetus
      (3) Adequate for a vaginal birth due to large size
   b. Android
      (1) Commonly known as a male pelvis
      (2) 32.5% of white women and 15.7% of nonwhite women
      (3) Heavy, heart-shaped pelvis leads to increased posterior
          positions, dystocia, operative births
   c. Gynecoid
      (1) Commonly known as the female pelvis
      (2) 41% to 42% of women's pelvis shapes
      (3) Good prognosis for vaginal birth
   d. Platypelloid
      (1) Rare pelvic type
      (2) Occurs in less than 3% of women
      (3) Prognosis of vaginal delivery is poor secondary to short
          anterior-posterior (AP) diameter

   • Effect of pregnancy on major body systems, with related clinical
     implications and patient education needs

1. Gastrointestinal
   a. Mouth and pharynx
      (1) Gingivitis is common and may result in bleeding of gums
      (2) Increased salivation
      (3) Epulis (a focal swelling of gums) may develop and resolves
          after the birth
      (4) Pregnancy does not increase tooth decay
   b. Esophagus
      (1) Decreased lower esophageal sphincter pressure and tone
      (2) Widening of hiatus with decreased tone
      (3) Heartburn is common
   c. Stomach
      (1) Decreased gastric emptying time
      (2) Incompetence of pyloric sphincter
      (3) Decreased gastric acidity and histamine output
   d. Large and small intestines
      (1) Decreased tone and motility
      (2) Altered enzymatic transport across villi, resulting in
          increased absorption of vitamins
      (3) Displacement of intestines, cecum, and appendix by the
          enlarging uterus
   e. Gallbladder
      (1) Decreased tone
      (2) Decreased motility
   f. Liver
      (1) Altered production of liver enzymes
      (2) Altered production of plasma proteins and serum lipids

2. Genitourinary/renal
   a. Dilation of renal calyces, pelvis, and ureters, resulting in
      increased risk of urinary tract infection (UTI)
   b. Decreased bladder tone
   c. Renal blood flow increases 35–60%
   d. Decreased renal threshold for glucose, protein, water-soluble
      vitamins, calcium, and hydrogen ions
   e. Glomerular filtration rate increases 40–50%
   f. All components of the renal-angiotensin-aldosterone system
      increase, resulting in retention of sodium and water, resistance
      of pressor effect of angiotensin II, and maintenance of normal
      blood pressure

3. Musculoskeletal
   a. Relaxin and progesterone affect cartilage and connective tissue
      (1) Results in a loosening of the sacroiliac joint and symphysis
          pubis
      (2) Encourages the development of the characteristic gait of
          pregnancy
   b. Lordosis

4. Respiratory
   a. Level of diaphragm rises about 4 cm because of the increase in
      uterine size
   b. Thoracic circumference increases by 5–6 cm and residual
      volume is decreased
   c. A mild respiratory alkalosis occurs because of decreased PCO₂
   d. Congestion of nasal tissues occurs
   e. Respiratory rate changes very little, but the tidal volume,
      minute ventilatory, and minute oxygen uptake all increase
      appreciably
   f. Some women experience a physiologic dyspnea due to the
      increased tidal volume and lower PCO₂

5. Hematologic changes
   a. Blood volume increases 30–50% from nonpregnant levels
   b. Plasma volume expands, which results in a physiologic anemia
   c. Hemoglobin averages 12.5 g/dL
   d. Some require an additional gram of iron during pregnancy
   e. Pregnancy can be considered a hypercoagulable state because
      fibrinogen (Factor I), and Factors VII–X all increase during
      pregnancy

6. Cardiovascular system
   a. Cardiac volume increases by about 10% and peaks at about 20
      weeks
   b. Resting pulse increases by 10–15 beats per minute, with the
      peak at 28 weeks
   c. Slight cardiac shift (up and to the left) due to the enlarging
      uterus
   d. Ninety percent of pregnant women develop a physiologic
      systolic heart murmur
   e. May have exaggerated splitting of S1, audible third sound, or
      soft transient diastolic murmur
   f. Cardiac output is increased
   g. Diastolic blood pressure is lower in first two trimesters because
      of the development of new vascular beds and relaxation of
      peripheral tone by progesterone, which results in decreased
      flow resistance

7. Integumentary system
   a. Vascular changes
      (1) Palmar erythema
      (2) Spider angiomas
      (3) Varicose veins and hemorrhoids
      (4) Hyperpigmentation is believed to be related to estrogens
          and progesterone, which have a melanocyte-stimulating
          effect
Chloasma, freckles, nevi, and recent scars may darken
Linea nigra
Increase in sweat/sebaceous activity
Change in connective tissues resulting in striae gravidarum
b. Hair growth
(1) Estrogen increases the length of the anagen (growth) phase of the hair follicles
(2) Mild hirsutism may develop in early pregnancy

Endocrine
a. Pituitary
(1) Prolactin levels are 10 times higher at term than in the nonpregnant state
(2) Enlarges by more than 100%
b. Thyroid
(1) Increases in size (about 13%)
(2) Normal pregnant woman is euthyroid because of estrogen-induced increase in thyroxin-binding globulin (TBG)
(3) TSH does not cross the placenta
(4) Thyroid-stimulating immunoglobulins and TRH cross the placenta
c. Adrenal glands
(1) Remain the same size; however, there is an increase in the zona fasciculata that produces glucocorticoid
(2) Twofold increase in serum cortisol
d. Pancreas
(1) Hypertrophy and hyperplasia of the B cells
(2) Insulin resistance as a result of the placental hormones, especially hPL

Metabolism
a. Weight gain during pregnancy
(1) Recommended weight gain is 11–40 lb depending on prepregnancy body mass index (BMI)
(2) Average weight gain is 28 lb—1.5 lb for placenta, 2 lb for amniotic fluid, 2.5 lb for uterine growth, 3 lb for increased blood volume, 1 lb for increased breast tissue, 7.5 lb for the fetus, and the remainder for maternal fat deposits
(3) Protein metabolism is increased
(4) Fat deposit and storage are increased to prepare for breastfeeding
(5) Carbohydrate metabolism is altered; blood glucose levels are 10–20% lower than prepregnant states

Maternal Psychological/Social Changes in Pregnancy
• Pregnancy is a time of many transitions; a woman is vulnerable; maternal moods may be labile
• First trimester (1–13 weeks)—focus on physical changes and feelings
  1. Psychological responses
     a. Ambivalence
     b. Adjustment
  2. Prenatal anticipatory guidance
     a. Normal changes of pregnancy

  1. Increased pigmentation
  2. Linea nigra
  3. Striae gravidarum
  4. Breast fullness
  5. Urinary frequency
  6. Nausea/vomiting
  7. Fatigue
  b. Calculate and explain EDD and comparison with uterine size
  c. Client's and healthcare provider’s expectations for visits
  d. Importance of ongoing care in pregnancy to promote well-being and prevent and recognize problems
  e. Rationale for vitamins and iron supplements
  f. Resources available for education, emergency care, and so on
  g. Discuss/review danger signs and symptoms

  • Second trimester (14–26 weeks)—more aware of the fetus as a person
  1. Psychological responses
     a. Acceptance
     b. Period of radiant health
  2. Prenatal anticipatory guidance
     a. Avoid exposure to teratogenic agents
        (1) cytomegalovirus, herpes simplex rubella, syphilis, varicella, toxoplasma
        (2) hyperthermia
        (3) environmental chemicals such as herbicides and polychlorinated biphenyl (PCB)
        (4) recreational drugs
        (5) if medication required in pregnancy (over-the-counter, herbal, or prescription), lowest possible dose should be considered, and minimizing first trimester exposure
     b. Fetal growth, movement, and fetal heart tones (FHTs)
     c. Personal hygiene, brassieres, vaginal discharge, and so on
     d. Infant feeding—breast and/or bottle
     e. Avoidance and alleviation of backache, constipation, hemorrhoids, leg aches, varicosities, edema, and round ligament pain
     f. Nutritional needs, diet, and weight gain
     g. Discuss/review danger signs and symptoms

  • Third trimester
  1. First part (27–36 weeks)—concerned with baby’s needs
     a. Psychological responses
        (1) Introversion
        (2) Period of watchful waiting
     b. Prenatal anticipatory guidance
        (1) Fetal growth and well-being
        (2) Review hygiene, clothing, body mechanics and posture, positions of comfort
        (3) Physical and emotional changes
        (4) Sexual needs/intercourse
        (5) Alleviation of backache, Braxton Hicks contractions, dyspnea, round ligament pain, leg aches, or edema
        (6) Confirm infant feeding plans and discuss preparation for breastfeeding
        (7) Preparation for baby supplies and help at home
        (8) Prenatal classes/approach
        (9) Involvement of significant other
Overview of Antepartum Care

- Purpose and objectives of antepartum care—to differentiate normal and pathologic maternal-fetal alterations throughout pregnancy by employing maternal-fetal assessment methods, techniques, and parameters appropriate to the antepartum period, specifically
  1. Application of the management process, including components of history and physical examination at initial and interval visits
  2. Critical evaluation of indications and techniques for the application of therapeutics during the antepartum period
  3. Incorporation of current evidence and research in the care of women and families during the antepartum period

- Definition of the essential concepts (Centers for Disease Control and Prevention [CDC], 2016)
  1. Fertility rate—number of live births/1,000 females 15–44 years of age
  2. Birth rate—number of births divided by total population in the given year(s)
  3. Live birth—birth of an infant, no matter the age of gestation, showing any signs of life (e.g., spontaneous breathing, beating of the heart, pulsation of the cord, movement of voluntary muscles)
  4. Neonatal period—28 completed days after birth
  5. Perinatal period—from the end of 22 weeks (154 days) gestational age up to seven days after birth; also defined as births weighing 500 g or more and ending at 28 completed days after birth
  6. Fetal death—spontaneous intrauterine death of a fetus at any time during the pregnancy; also referred to as stillbirth if it occurs after 20 weeks or more
  7. Stillbirth rate (fetal death rate)—the ratio of fetal deaths divided by the sum of births (including live births and fetal deaths) in any given year
  8. Neonatal death—early neonatal death is death during the first seven days after birth; late neonatal death is death between 7 and 28 days
  9. Neonatal mortality rate—the number of neonates dying before reaching 28 days of age per 1,000 live births in a given year
  10. Perinatal mortality—refers to the number of stillbirths and deaths in the first week of life
  11. Perinatal mortality rate—the number of stillbirths and perinatal deaths (in the first week of life) per 1,000 total births
  12. Infant mortality—death of an infant in the first 12 months of life
  13. Infant mortality rate—number of infant deaths (in the first 12 months of life) per 1,000 live births
  14. Maternal morbidity—illness or disease associated with childbearing
  15. Maternal mortality ratio—number of maternal deaths that result from the reproductive process/100,000 live births
  16. Abortus—fetus or embryo removed or expelled from the uterus during the first half of gestation (20 weeks or less), weighing less than 500 g
  17. Late preterm infant (34 0/7–36 6/7 weeks of gestation)
  18. Early term infant—(37 0/7–38 6/7 weeks of gestation)
  19. Term infant—infant born after 37 completed weeks of gestation up until 42 completed weeks of gestations (260–294 days)
  20. Post-term infant—infant born any time after completion of the 42nd week beginning with day 295
  21. Direct maternal death—death of the mother resulting from obstetric complications of pregnancy, labor, or the puerperium; and from interventions, omissions, incorrect treatment, or a chain of events resulting from any of these factors

Antepartum Visit

- Terminology that describes women and their pregnancies (King, Brucker, Kriebs, & Fahey, 2015)
  1. Gravida—the number of times a woman has been pregnant
  2. Para—refers to the number of pregnancies carried to the 20th week of gestation or the delivery of an infant weighing more than 500 g, no matter the outcome
  3. Nulligravida—a woman who has never been pregnant
  4. Nullipara—a woman who has not carried a baby to 500 g or 20 weeks
  5. Primigravida—a woman who is pregnant for the first time
  6. Primipara—a woman who has carried a pregnancy past the 20th week of gestation or who is currently pregnant for the first time and is carrying past the 20th week
  7. Multigravida—a woman pregnant two or more times
8. Multipara—a woman who has carried two or more pregnancies past the 20th week of gestation or who has delivered an infant weighing more than 500 g more than once

9. Grand multipara—has given birth seven times or more

10. TPAL numerical description of parity—four-digit system that counts all fetuses/babies born rather than pregnancies carried to viability

\[ T = \text{term babies (37 weeks or 2500 g)} \]
\[ P = \text{premature babies (20–36 weeks; 500–2499 g)} \]
\[ A = \text{abortions (any fetus born } < 20 \text{ weeks and 500 g)} \]
\[ L = \text{current living children} \]

- Components of the antepartum visit (initial and return)
  1. The Pregnant Patient’s Bill of Rights
  2. Complete history
     a. Menstrual history
     b. Contraceptive history
     c. Obstetric history, including quickening
     d. Medical-surgical history
     e. Sexual history
     f. History or current physical, sexual, emotional abuse
     g. Medicines and/or complementary alternative medicines and therapies
     h. Family history
     i. Genetic risk
     j. Health habits
     k. Environmental exposures
     l. Social history
     m. Exercise and nutrition history
     n. Immunizations
  3. Physical examination
     a. Height, weight, and vital signs
     b. Complete physical examination
     c. Abdominal examination
        1. Fundal height—measured in centimeters, from pubic symphysis to the fundus of the uterus
        2. Leopold’s maneuvers—four abdominal palpation maneuvers used to determine the following fetal characteristics
           a. Lie
           b. Presentation
           c. Position
           d. Attitude
           e. Variety
           f. Estimated fetal weight
        3. Fetal heart tones—auscultation of presence and pattern of FHR
        4. Bimanual examination—performed in the first trimester to determine uterine size and thus estimate gestational age
        5. Clinical pelvimetry—measurement of the features of the bony pelvis with the examiner’s hand
           d. The pelvis (only the true pelvis is of significance)—true pelvis is bony canal through which the fetus passes and that lies below the pelvic brim (linea terminalis)
              1. Three planes of obstetric significance—inlet, midplane, and outlet
              2. Critical diameters for evaluation of pelvic adequacy
                 a. Inlet—AP, transverse
        3. Assessing and measuring the pelvis—clinical pelvimetry
           a. Diagonal conjugate—extends from middle of sacral promontory to the inferior margin of symphysis pubis; only AP diameter that can be measured clinically; should be more than 11.5 cm
           b. Pubic arch—formed by the descending rami of pubic bones and inferior margin of symphysis pubis; angle should be at least 90 degrees
           c. Interspinous diameter—distance between ischial tuberosities, normally measures 10 cm, is smallest diameter of the pelvis and defines the midplane
           d. Ischial spines—may be prominent, encroaching, or blunt; assess the sidewalls and the sacrum; best if blunt
           e. Sacrosciatic notch—note shape and width in fingerbreadths
           f. Sidewalls—sidewalls extend from the upper anterior angle of the sacrosciatic notch to the ischial tuberosities and are assessed as straight, convergent, or divergent; should be straight
           g. Sacrum—assess the inclination of the sacrum, the length, and the curvature; curved is best
           h. Intertuberosal diameter—distance between the ischial tuberosities, about 11 cm

4. Laboratory studies used in the provision of antepartum care
   a. Initial visit
      1. Blood type, Rh factor, antibody screen, complete blood count (CBC), rapid plasma reagin (RPR) or venereal disease research laboratory (VDRL), rubella titer, hepatitis B surface antigen (HBsAg), urine culture/ screen
      2. HIV testing should be recommended to all pregnant women with option to decline testing
      3. Gonorrhea (GC), chlamydia (CT), and wet-mount tests (also called a vaginal smear or a wet prep), TSH, Hgb A1C, as indicated by history and physical examination findings
      4. Pap test per routine recommendations
      5. Positive purified protein derivative (PPD) skin test, hemoglobin (Hgb) electrophoresis, genetic screening tests as indicated by history and risk factors
   b. Prenatal genetic screening tests (American College of Obstetricians and Gynecologists, 2016a)
      1. Two main types of prenatal genetic tests
         a. Prenatal screening tests—tests that provide the risk for certain genetic disorders such as aneuploidy (a condition wherein the infant has a missing or has an extra chromosome)
         b. Prenatal diagnostic tests—confirmatory tests using cells from the fetus or placenta
      2. Different types of prenatal screening tests
         a. Carrier screening—serologic or tissue testing performed before or during the pregnancy, on the mother and/or father, to determine if they carry specific genetic illnesses
         b. Prenatal genetic screening—serologic testing combined with ultrasonography performed during pregnancy to screen for aneuploidy and spine and brain defects
(3) First-trimester screening—performed between 10 and 13 weeks; by combining serologic testing for pregnancy-associated plasma protein (PAPP-A) and hCG, an ultrasound exam to measure nuchal translucency, along with the mother’s age, a risk for trisomy 18 and 21 is calculated

(4) Second-trimester screening (also known as quad or quadruple screen)—serologic blood test performed between 15 and 22 weeks to detect neural tube defects and trisomy 18 and 21; serologic testing measuring maternal serum alphafetoprotein (MSAFP), estriol, inhibin A, and hCG; in addition to the blood test, an ultrasound exam is performed between 18 and 20 weeks to determine if there are anatomical fetal defects, specifically of the brain, spine, face, abdomen, heart, and limbs

(5) Combined first- and second-trimester screening—results of first- and second-trimester screening are combined to calculate risk for detecting trisomy 21

(6) Cell-free DNA testing—serologic screening test on mother analyzes the small amount of DNA that is released from the placenta into the bloodstream of the mother; screens for aneuploidy (trisomy 13, 18, 21) and problems with sex chromosomes; this screening test can be performed as early as 10 weeks, and results may take up to one week; positive cell-free DNA results need to be followed by a diagnostic test (chorionic villus sampling (CVS) or amniocentesis)

(7) Prenatal screen test results
   (a) Positive screening test—indicates that the fetus has an increased risk for aneuploidy than the general population; this is only a screening and is not diagnostic; positive result does not mean that the fetus definitely has the disorder
   (b) Negative screening test—indicates that the fetus has a lower risk for aneuploidy than the general population compared to the general population; however, this is only a screening, so the possibility that the fetus definitely has the disorder is not completely ruled out

c. Ultrasound
   (1) Fetal cardiac activity
   (2) Fetal presentation
   (3) Placental position
   (4) Fetal number
   (5) Fetal biometry
   (6) Fetal number
   (7) Anatomic survey
   (8) Specialized examination, as indicated
      (a) Targeted/detailed anatomic survey
      (b) Doppler flow
      (c) Biophysical profile (BPP)
      (d) Fetal echocardiography
   (9) As an adjunct to diagnostic testing
d. Gestational diabetes screening at 24–28 weeks—see the section on diabetes in “Medical Complications” later in this chapter
e. Repeat antibody screen at 26–28 weeks for Rh-negative mother
f. Repeat CBC/hematocrit (Hct), VDRL/RPR, CT, GC, HIV, HBsAg as indicated by history, physical examination findings, and risk factors in third trimester
g. Group B streptococcus (GBS) screening at 35–37 weeks—vaginal introitus and rectal specimens
h. Some other laboratory studies that might be indicated include
   (1) Amniocentesis or CVS
   (2) Tay-Sachs screening
   (3) Maternal/paternal chromosomal studies
   (4) Chest radiographs
   (5) Blood chemistry (basic or comprehensive metabolic panel)
   (6) Thyroid studies
   (7) Toxoplasmosis testing
   (8) Cytomegalovirus (CMV)
   (9) Herpes simplex virus (HSV) cultures or antibody testing
   (10) Antinuclear antibody (ANA)
   (11) Antiphospholipid antibodies
   (12) Serum iron studies
   (13) Blood glucose studies (three-hour glucose tolerance test [GTT], fasting blood sugar [FBS], two-hour postprandial, and hemoglobin A1c)

5. Subsequent (interval) prenatal visits—frequency of
   a. Every 4 weeks to 28 or 32 weeks
   b. From 28 or 32 weeks to 36 weeks every 2 weeks
   c. Weekly visits from 36 weeks to 41 weeks
   d. Some prefer biweekly visits 41 weeks to delivery
   e. Schedule more frequent visits as appropriate; some providers recommend fewer prenatal visits if there are no problems

6. Content of prenatal revisits
   a. History
   b. Physical examination—blood pressure, urine dipstick, weight, FHT, fundal height
   c. Anticipatory management
   d. Anticipatory guidance
   e. Health education and counseling
   f. Appropriate screening

• Prenatal risk factors

1. History
   a. Genetic factors
      (1) Maternal age at or older than 35 years
      (2) Previous child with a chromosome abnormality
      (3) Family history of birth defects or mental retardation
      (4) Ethnic/racial origins
         (a) African—sickle cell disease
         (b) Mediterranean or East Asian—β thalassemia
         (c) Jewish—Tay-Sachs disease
   b. Multiple pregnancy losses/previous stillbirth
   c. Psychological/mental health disorders
   d. History of intrauterine growth restriction (IUGR)
   e. Preterm birth(s)

2. Current pregnancy
   a. Abnormal multiple marker screening
   b. Exposure to possible teratogens
      (1) Radiation
      (2) Alcohol/medications/other substances
      (3) Occupational exposures
(4) Infections
   (a) Toxoplasmosis
   (b) Rubella
   (c) CMV
   (d) Syphilis
   (e) Zika

c. IUGR
d. Oligohydramnios/polyhydramnios
e. Diabetes
   (1) Pregestational
   (2) Gestational
      (a) Diet-controlled
      (b) Medication-controlled (by insulin or oral medications)
f. Hypertension
   (1) Chronic
   (2) Gestational
g. Preeclampsia/eclampsia
h. Multiple gestation
i. PROM
j. Post dates
k. Decreased fetal movement
l. Rh isoimmunization

Common Discomforts of Pregnancy and Comfort Measures

- Nausea and vomiting of pregnancy (NVP; most common in first trimester) (American College of Obstetricians and Gynecologists, 2015)
  1. Nausea and vomiting—50% of pregnant women; nausea only, 25%; unaffected, 25%
  2. NVP is different from hyperemesis gravidarum (HG), which happens much less frequently, at approximately 0.3–3% of pregnancies
     a. HG is a diagnosis of exclusion when other causes of nausea and vomiting have been explored
     b. Documented weight loss from prepregnancy weight is seen with HG
     c. Signs of acute starvation such as presence of ketones in the urine
     d. Abnormal bloodwork may also include a shift in electrolyte, thyroid, and liver enzymes
  3. Nonpharmacologic therapies for NVP
     a. Prevention—women who were taking multivitamins at the time of conception are less likely in need of treatment for vomiting; recommend for women of reproductive age to take prenatal vitamins three months prior to conceiving to reduce likelihood and intensity of NVP
     b. Avoid triggers such as odors that provoke symptoms
     c. Small, frequent meals every one to two hours
     d. Avoid spicy or fatty foods; eat bland or dry foods; eat foods that are high in protein
     e. Try to eat something like crackers or toast before getting up and out of bed
     f. Discontinue prenatal vitamins with iron until nausea and vomiting resolved, but continue folic acid
g. Acupressure, acupuncture, or acustimulation at the P6 (or Neiguan)—conflicting evidence for this therapy

4. Pharmacologic treatments for NVP
   a. Ginger 1 g per day in divided doses
   b. Pyridoxine (vitamin B₆) 10–25 mg quid or tid orally; maximum dose of 200 mg/day
   c. Diclegis (approved by the FDA in 2013) combined pyridoxine 10 mg and doxylamine 10 mg orally; two tablets for moderate NVP before bedtime; for severe NVP, four tablets, one tablet in the morning, one in the afternoon, and two at bedtime
   d. Metoclopramide 5 to 10 mg q6–8h orally
   e. Promethazine 25 mg q4h per rectal suppository
   f. Ondansetron—although use of this drug is increasing, evidence is limited on its safety or efficacy; risk vs benefit should be weighed with each case

- Breast tenderness
  1. Good support brassiere
  2. Careful lovemaking
  3. Reassurance that it will soon pass

- Backache
  1. Consider other differential diagnoses for musculoskeletal strain, sciatica, sacroiliac joint problem, preterm labor, UTI
  2. Nonpathologic—related to normal changes in pregnancy
     a. Massage
     b. Application of ice or heat
     c. Hydrotherapy
     d. Pelvic rock
     e. Good body mechanics
     f. Pillow in lumbar area when sitting or between legs when lying on side
     g. Pregnancy support harness or girdle
     h. Good support brassiere
     i. Supportive low-heeled shoes
  3. Sacroiliac joint problems
     a. Teach appropriate exercises
     b. Nonelastic sacroiliac belt
     c. Trochanteric belt worn below the abdomen at the femoral heads to increase joint stability

- Fatigue
  1. Reassurance that this is a normal first-trimester problem and will pass
  2. Mild exercise and good nutrition
  3. Decrease activities and plan rest periods
  4. Decrease fluid intake in evening to decrease nocturia

- Heartburn
  1. Small, frequent meals
  2. Decrease amount of fluids taken with meals; drink fluids between meals
  3. Papaya (may recommend fresh, dried, juice, or enzymes)
  4. Elevate head of bed 10–30 degrees
  5. Slippery elm bark throat lozenges
  6. Antacids
  7. Proton pump inhibitors and H₂ blockers—Pregnancy Category B
• Constipation
  1. Increased fluids, fiber
  2. Prune juice or warm beverage in the morning
  3. Encourage exercise
  4. Stool softeners

• Hemorrhoids
  1. Avoid constipation or straining with a bowel movement
  2. Elevate hips with pillow or knee–chest position
  3. Sitz baths
  4. Witch hazel or Epsom salt compresses
  5. Reinsert hemorrhoid with lubricated finger
  6. Kegel exercises
  7. Topical anesthetics; Pregnancy Category C if combined with steroid

• Varicosities
  1. Support stockings; apply before getting out of bed
  2. Avoid wearing restrictive clothing
  3. Perineal pad if vaginal varicosities
  4. Rest periods with legs elevated; avoid crossing legs

• Leg cramps
  1. Decrease phosphate in diet; no more than two glasses of milk per day
  2. Massage affected leg
  3. Do not point toes, flex ankle to stretch calf
  4. Keep legs warm
  5. Walk, exercise
  6. Calcium tablets
  7. Magnesium tablets

• Presyncopal episodes
  1. Change positions slowly
  2. Push fluids; regular caloric/glucose intake
  3. Avoid lying flat on back; avoid prolonged standing or sitting

• Headaches
  1. Rule out migraines and other pathologic causes of headache
  2. Head, shoulder, and/or neck massage
  3. Acupressure
  4. Hot or cold compresses
  5. Rest
  6. Follow a regular sleep schedule
  7. Warm baths
  8. Meditation and biofeedback
  9. Aromatherapy
  10. Eat smaller, more frequent meals
  11. Mild analgesic such as acetaminophen 325 mg one to three tablets every four hours as needed

• Leukorrhea
  1. Rule out vaginitis and sexually transmitted infection (STI)
  2. Good perineal hygiene
  3. Wear cotton-crotch panties; change panties as often as necessary
  4. Unscented panty liners
  5. Instructions to avoid douching and use of feminine sprays

• Urinary frequency
  1. Decrease fluids in evening to avoid nocturia
  2. Avoid caffeine
  3. Rule out UTI

• Insomnia
  1. Warm bath
  2. Hot drink—warm milk, chamomile tea
  3. Quiet, relaxing, minimally stimulating activities
  4. Avoid daytime napping

• Round ligament pain
  1. Rule out other causes of abdominal pain, such as appendicitis, ovarian cyst, placental separation, inguinal hernia
  2. Warm compresses, ice compresses
  3. Hydrotherapy
  4. Avoid sudden movement or twisting movements
  5. Flex knees to abdomen, pelvic tilt
  6. Support uterus with a pillow when lying down
  7. Maternity abdominal support or girdle

• Skin rash
  1. Ice
  2. Oatmeal bath
  3. Diphenhydramine—25 mg orally every four hours as needed for itching
  4. Dermatology referral as needed

• Carpal tunnel syndrome (tingling and numbness of fingers)
  1. Good posture
  2. Lying down
  3. Rest and elevate affected hands
  4. Ice, wrist splints
  5. Mild analgesic such as acetaminophen 325 mg one to three tabs every four hours as needed

Nutrition during Pregnancy

• Recommended daily allowances
  1. Calories—2,500 kcal
  2. Protein—average of 60 g/day throughout pregnancy

• Weight gain in pregnancy
  1. BMI (weight/height²)—only anthropometric measurements with documented clinical value for assessment of gestational weight gain
  2. Weight-for-height categories
     a. Underweight—BMI less than 18.5
     b. Normal weight—BMI 18.5–24.9
     c. Overweight—BMI 25.0–29.9
     d. Obese—BMI 30.0 or higher
3. Determinants of gestational weight gain
   a. Prepregnant weight—if overweight at conception, more likely to gain less weight than normal-weight woman
   b. Low gestational weight gain associated with
      (1) Low family income
      (2) Black race
      (3) Young age
      (4) Unmarried status
      (5) Low educational level
   c. Multiple gestation
   d. Developing pathology—toxemia
4. Consequences of gestational weight gain
   a. Low gestational weight gain is associated with
      (1) Growth-restricted infants
      (2) Fetal and infant mortality
   b. High gestational weight gain is associated with
      (1) Greater rate of large infant weight; may increase risk for
          (a) Fetopelvic disproportion
          (b) Operative delivery (forceps, vacuum, or cesarean)
          (c) Birth trauma
          (d) Asphyxia
          (e) Postpartum hemorrhage
          (f) Mortality
      (2) Above associations are more pronounced in short women
          (< 157 cm or 62 in.)
5. Recommended patterns and quantity of weight gain
   a. Normal prepregnant weight—0.8–1.0 lb per week during second and third trimesters for total of 25–35 lb
   b. Underweight before pregnancy—1.0–1.3 lb per week in second and third trimesters for total of 28–40 lb
   c. Overweight before pregnancy—0.5–0.7 lb per week in second and third trimesters for total of 15–25 lb
   d. Obese before pregnancy—0.4–0.6 lb per week in second and third trimesters for total of 11–20 lb

• Diet history—recall of fluid and solid food intake in the last 24 hours with the purpose of evaluating adequacy of nutrition and formulating a plan for nutrition counseling
1. Components of diet history
   a. Qualitative components of the intake
   b. Quantitative, but only if weight is an issue
   c. Ascertain how typical the last 24-hour intake was to usual intake
2. Components of diet counseling
   a. Diet assessment
   b. Set a weight gain goal with the woman for the pregnancy
   c. Discuss food preferences and relationship to goal
   d. Review generally or specifically at each visit, depending on results
   e. Include fetal growth as part of parameters
3. Cultural and personal beliefs about nutrition that may modify a diet plan include
   a. Pica—ingestion of nonfood substances (i.e., starch, clay)
   b. Vegetarianism
   c. Hot and cold foods and when they can be eaten
   d. Discern eating patterns and beliefs pertinent to pregnancy in the woman’s culture

The Woman and Her Family and Their Role in Pregnancy

• Family
  1. Assessment of family size, structure, and relationships
  2. Significant individuals involved in pregnancy
  3. Family roles and their relationship to family function
     a. Occupations
     b. Income levels
     c. Education levels
     d. Nationality and ethnic background
     e. Relationship status and intensity
  4. Feelings and thoughts about this pregnancy and any past pregnancies and births

• Pregnancy as essential, permanent family and life change
  1. The significance of change in relation to pregnancy
  2. Role adaptation needed to cope successfully with pregnancy
  3. Family resources to be mobilized to enable the family to cope
     a. Clear and continuous communication of information
     b. Decision making by the woman and family as indicated
     c. Family’s development of an appropriate birth plan
        (1) Childbirth preparation
        (2) Breastfeeding
        (3) Childrearing classes
     d. Information regarding critical resources in birth site
        (1) Labor and birth procedures and expectations
        (2) Rooming-in
        (3) Breastfeeding support
        (4) Sibling visitation and/or presence at birth
        (5) Family visitation
        (6) Possibility of early discharge

• Perinatal loss and associated grief stages and process
  1. Factors associated with the concept of loss and grieving
     a. Perception of the individual(s) experiencing the loss and its severity
     b. Support and assistance in doing grief work
  2. Types of maternity losses
     a. Infertility
     b. Loss of a baby
        (1) Miscarriage
        (2) Abortion
        (3) Stillbirth
     c. Adoption
     d. Loss of expectations
        (1) Premature infant
        (2) Congenital deformities
        (3) “Damaged” infant
  3. Stages of grief
     a. Shock, manifested by
        (1) Denial
        (2) Disbelief
1. Preparation for childbirth—ultimately aids in reducing need for analgesics/anesthetics during labor
   a. Formal or informal
   b. Content to be included:
      (1) Bodily changes in pregnancy with associated reproduction anatomy
      (2) Exercises for activities of daily living (ADL) during pregnancy and for labor
      (3) Nutrition
      (4) Fetal growth and development
      (5) Substance abuse
      (6) Signs of beginning labor
      (7) Information for infant feeding decision making
      (8) Preparation for breastfeeding
      (9) Postpartal course and care
      (10) Preparation of siblings for birth
      (11) Pain coping strategies in labor
      (12) Vaginal birth after cesarean (VBAC) versus elective repeat cesarean section (ERCs) if previous C-section
2. Learning needs of the breastfeeding woman
   a. Anticipatory guidance for woman with inverted nipples
   b. Principles of milk production
      (1) Caloric needs of mother
      (2) Liquid needs of mother
      (3) Mechanics of proper infant positioning and latching on
      (4) Factors that affect milk supply
3. Learning needs for parenthood
   a. Plans for the baby’s health care
   b. Needs and adaptation for the home
   c. Identification of family/social supports
4. Maladaptive grief reactions
   a. Avoidance or distortion of normal grief expression
   b. Agitated depression; somatic conditions
   c. Morbid attachment to possessions of deceased
   d. Persistent loss of self-esteem
5. Healthcare provider’s role in helping the normal grieving process
   a. Listen
   b. Facilitate woman’s expression of feelings
   c. Provide nonjudgmental environment
   d. Accept behaviors of grief

Teaching and Counseling

- Principles of learning that apply to women/families during pregnancy
  1. Factors that facilitate or impede learning
     a. Readiness of the learner; time to discuss
     b. Healthcare provider’s knowledge of woman’s and family’s learning needs
     c. Group teaching—enhances and enriches learning
  2. Factors that critically influence teaching/learning
     a. Alternative lifestyles; different cultures
     b. Disadvantaged social milieu
     c. Age and maturity—adolescents, educational level, life experience
- Principles of teaching for role of parent educator
  1. Individual teaching and counseling—topic and quantity of information need to fit the client
  2. Prioritize information provision
     a. Respond to questions or experiences of the woman
     b. Anticipatory guidance of pregnancy realities
     c. Danger signs of critical complications; drug dangers, prescription, over-the-counter, and illegal drugs; any other information needed for health and well-being of woman and fetus
- Childbirth education
  1. Preparation for childbirth—ultimately aids in reducing need for analgesics/anesthetics during labor
     a. Formal or informal
     b. Content to be included:
        (1) Bodily changes in pregnancy with associated reproduction anatomy
        (2) Exercises for activities of daily living (ADL) during pregnancy and for labor
        (3) Nutrition
        (4) Fetal growth and development
        (5) Substance abuse
        (6) Signs of beginning labor
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         (1) Caloric needs of mother
         (2) Liquid needs of mother
         (3) Mechanics of proper infant positioning and latching on
         (4) Factors that affect milk supply
   3. Learning needs for parenthood
      a. Plans for the baby’s health care
      b. Needs and adaptation for the home
      c. Identification of family/social supports
- Family planning
  1. Pregnancy learning needs for postpartum contraceptive options
  2. Learning needs when considering postpartum bilateral tubal ligation
     a. Expert counseling
     b. Signing consent papers
- Human sexuality and pregnancy
  1. The effects of pregnancy on female and male sexual response
  2. Changes in sexual desire throughout pregnancy— influenced by hormones, energy level, relationship, body image, fears of hurting baby, cultural beliefs and practices
  3. Concept of body image—may feel awkward, clumsy, ugly, especially in late pregnancy
  4. Factors during pregnancy that may alter this image—support or lack thereof for her feelings; responses, either positive or negative, from people of importance
  5. Variations in sexual practice and their use during pregnancy
     a. Positions for intercourse—alternate positions may enhance comfort with increase in abdominal size
     b. Cunnilingus
Pharmacologic Considerations in the Antepartum Period

- Teratogens (derived from Greek word meaning “monster”)—any agent that acts during embryonic or fetal development to produce a permanent alteration of form or function
- FDA risk factor categories for prescription drugs in pregnancy
  1. Category A—adequate, well-controlled studies in pregnant women have not shown an increased risk of fetal abnormalities
  2. Category B—animal studies have revealed no evidence of harm to the fetus; however, there are no adequate and well-controlled studies in pregnant women OR animal studies have shown an adverse effect, but adequate and well-controlled studies in pregnant women have failed to demonstrate a risk to the fetus
  3. Category C—animal studies have shown an adverse effect, and there are no adequate and well-controlled studies in pregnant women OR no animal studies have been conducted, and there are no adequate and well-controlled studies in pregnant women
  4. Category D—studies, adequate and well-controlled or observational, in pregnant women have demonstrated a risk to the fetus; however, the benefits of therapy may outweigh the potential risk
  5. Category X—studies, adequate and well-controlled or observational, in animals or pregnant women have demonstrated positive evidence of fetal abnormalities. The use of the product is contraindicated in women who are or may become pregnant (Demian & Rizk, 2014)

**NOTE:** The Pregnancy and Lactation Labeling Final Rule went into effect on June 30, 2015. By June 29, 2018, all FDA risk factor categories are to be removed from drug labels and replaced by narrative sections to include a more comprehensive description of pregnancy and lactation risk and effects.

- Live vaccines are generally contraindicated in pregnancy because of concerns about the risk of transmitting the virus to a developing fetus. Recommendation to give the vaccine four weeks prior to pregnancy or to wait during the postpartum period.
- Vaccines that are considered safe in pregnancy:
  1. Tdap—the Advisory Committee on Immunization Practices (ACIP) recommends Tdap vaccination during each pregnancy whether or not the patient has received Tdap (or Td) in the past (Centers for Disease Control and Prevention, 2014c)
  2. Hepatitis B—high-risk women who are antigen and antibody negative can be vaccinated during pregnancy
  3. Tetanus—vaccination during pregnancy can protect at-risk newborns against neonatal tetanus; in maternal trauma, may be indicated
  4. Influenza—trivalent inactivated influenza vaccine (TIV) recommended for all pregnant women during influenza season; live attenuated nasal influenza vaccine contraindicated during pregnancy

Techniques Used to Assess Fetal Health

- Ultrasound (USG, US)
  1. Definition—method in which intermittent high-frequency sound waves are transmitted through tissues by way of a transducer placed on the abdomen or in the vagina and are then reflected off the underlying structures so that tissues, fluid, bones, fetal activity, and vessel pulsations are discernible
  2. Types of ultrasound
    a. Abdominal ultrasound is the most commonly used method
    b. Transvaginal ultrasound may be used in early pregnancy
  3. Some uses for ultrasound in obstetrics
    a. Assessment of bleeding in the first trimester
    b. Rule out (R/O) suspected ectopic pregnancy or hydatidiform mole
    c. Estimated gestational age for patients with uncertain LMP
    d. Evaluation of size/dates discrepancy
    e. R/O suspected multiple gestations or fetal anomalies
    f. Adjunct to special procedures—reproductive endocrinology procedures, CVS, amniocentesis, fetoscopy
    g. Sex identification
    h. Evaluation of second- and third-trimester bleeding
    i. Evaluation of pelvic mass or uterine abnormality
    j. Evaluation of placental problems, location, grade
    k. Evaluation of fetal growth—macrosomia, IUGR, AFI
    l. BPP—AFI, fetal movements, respiratory movements, fetal tone
    m. Estimation of fetal size and/or presentation
    n. R/O suspected fetal demise
- Doppler velocimetry blood flow assessment
  1. Used in tertiary settings only if uteroplacental insufficiency resulting in IUGR is suspected or is present
  2. Detects velocity of blood flow through the fetal umbilical artery to the placenta and is displayed in a waveform
  3. Normal waveforms produced when the ratio of systolic to diastolic blood flow (S/D ratio) is around 3; abnormal ratio is more than 3
- Amniocentesis
  1. Amniotic fluid is aspirated from the amniotic sac and evaluated for genetic well-being or disorders, and fetal lung maturity
  2. Usually performed between 14 and 16 weeks for genetic evaluation or assessment of neural tube defects
  3. Used later in pregnancy—assessment of lung maturity; R/O amnionitis or fetal hemolytic disease (Rh or anti-D)
  4. Risks—infection, bleeding, preterm labor, PROM, fetal loss
5. Benefits
   a. Provides early diagnosis and may decrease morbidity and mortality if elective abortion (AB) is sought
   b. May decrease psychological stress; support systems can be established prior to delivery
   c. If a lethal anomaly is diagnosed and pregnancy continues, allows parents/care providers to plan (i.e., avoid a C-section)

6. Special precaution—if mother is Rh negative and at risk for isoimmunization, administer RhoGAM with amniocentesis

- Chorionic villus sampling (CVS)/chorionic villus biopsy (CVB)
  1. A sample of chorionic villi from placenta is aspirated either transabdominally or transcervically; outer trophoblastic layer is obtained because these tissues have same genetic makeup as the fetus; tissue is examined for genetic information
  2. Used for prenatal diagnosis; performed between 10 and 13 weeks

3. Benefits
   a. Performed three to four weeks earlier than amniocentesis
   b. Cultures grow rapidly, resulting in early diagnosis

4. Risks
   a. Infection, bleeding, miscarriage
   b. Risk of limb deformities (if performed before nine weeks)
   c. Technically more difficult
   d. Contraindicated when there is a maternal blood group sensitization

- Fetal movement counting (FMC)/fetal kick counts—maternal self-report of fetal movement to assess fetal wellness
  1. FMC
     a. Most women are aware of fetal movement between 16 and 22 weeks' gestation; multiparas are generally aware of movement sooner than nulliparas are
     b. The fetus has periods of sleep and wakefulness that change according to gestation
     c. Fetal movement is strongest between 29 and 38 weeks
     d. FMC is a safe, simple, no-cost, noninvasive fetal assessment technique
     e. Research has demonstrated that fetal activity is a good predictor of well-being
     f. Dramatic decrease or cessation of movement is cause for concern
  2. Methods for performing FMC—adjusted to client's abilities with instructions to count fetal movements starting at 28 weeks (identifiable risk present) or 34–36 weeks (low risk for uteroplacental insufficiency)
     a. Sanovsky's protocol
        (1) Count FM 30 minutes three times daily; four or more movements in a 30-minute period is reassuring
        (2) If fewer than four movements in a 30-minute period, then continue for one hour
        (3) Contact care provider if fewer than 10 movements or if movements become weak
     b. Cardiff "count to 10" method
        (1) A chart to check off 10 fetal movements in one counting session
        (2) Start at approximately the same time daily
        (3) Chart how long it took to count 10 movements

4. If fewer than 10 movements in 10 hours or amount of time to reach 10 movements increases, a nonstress test (NST) should be performed

- Nonstress test (NST)
  1. Method to assess fetal well-being by observing the FHR response to fetal movement
  2. Seventy-five percent of fetuses at 28 weeks experience heart rate accelerations in association with fetal movement
  3. External electronic fetal monitoring (EFM) is used to record FHR accelerations in response to fetal movement
  4. Accelerations may be spontaneous or may be induced by vibroacoustic stimulation (VAS)
  5. Fetal hypoxia depresses the medullary center in the brain that controls FHR response, resulting in depression of frequency or amplitude of the FHR

6. Indications for assessment of fetal well-being with NST include
   a. Decreased fetal movement
   b. Postdates
   c. Diabetes, hypertension, IUGR

7. Interpretation of results
   a. Reactive—two or more accelerations in FHR of 15 or more beats per minute, lasting for 15 seconds or more, within a 15- to 20-minute period for > 32 weeks gestational age. If between 28–32 weeks, criteria is 10 or more beats per minute, lasting 10 seconds.
   b. Nonreactive—FHR fails to demonstrate the required accelerations within a 40-minute period, requiring further evaluation
   c. Unsatisfactory or inconclusive—FHR tracing that is uninterpretable or of poor quality, sometimes caused by a vigorous infant; test should be repeated (individual site protocols vary)
   d. NSTs may be affected by any of the following
      (1) Fetal sleep
      (2) Smoking within 30 minutes of testing
      (3) Maternal intake of medications
      (4) Fetal central nervous system (CNS) anomalies
      (5) Fetal hypoxia and/or acidosis
   e. A nonreactive NST may be followed by a BPP, a contraction stress test, or a repeat NST
   f. If indicated, NSTs should be repeated either weekly or biweekly

- Contraction stress test (CST)/oxytocin challenge test (OCT)—assessment of fetal well-being by observing FHR response to uterine contractions
  1. Physiology
     a. During uterine contractions, placental vessels are compressed and intervillous blood flow to the fetus is decreased
     b. A fetus who is compromised or hypoxic have decreased oxygenation, and this may result in metabolic acidosis

2. Method
   a. Test is conducted in hospital
   b. EFM; monitor the FHR response to uterine contractions
   c. Contraction may be spontaneous, the result of administration of exogenous oxytocin, or from nipple stimulation
   d. An acceptable test is one with three contractions lasting 40–60 seconds that are palpable
CHAPTER 7 Prenatal Care and Fetal Assessment

3. Results
   a. Negative—no late or variable decelerations
   b. Equivocal or suspicious—presence of nonrepetitive or nonpersistent decelerations, or long-term variability is absent
   c. Positive—persistent late decelerations with 50% or more of the contractions

4. Contraindications to CST
   a. Absolute—previous classical C-section or myomectomy, placenta previa, at risk for preterm labor
   b. Relative—gestational age less than 37 weeks, multiple gestation

• Biophysical profile (BPP)—procedure utilizing ultrasound to evaluate five fetal variables to assess fetal risk; prospective studies have demonstrated that BPP is superior to CST as a predictor of fetal well-being or distress

1. Method
   a. Test is composed of five observable variables—NST, muscle tone, breathing movements, gross body movements, and AFV
   b. In addition to NST, the fetus is evaluated via USG for a 30-minute time period to observe the remaining four variables

2. BPP scoring—each of the five variables is scored from 0 (abnormal) to 2 (normal); the scores for each are totaled
   a. Breathing movements—one or more episodes in 30 minutes; none = 0, present = 2
   b. Body movement—three or more discrete body or limb movements in 30 minutes; none = 0, present = 2
   c. Tone—one or more episodes of extension with return to flexion; none = 0, present = 2
   d. Qualitative AFV—at least one pocket of amniotic fluid that measures at least 2 cm in 2 perpendicular planes; none = 0, present = 2
   e. Reactivity—reactive NST; nonreactive scored as 0, reactive = 2

3. Scoring interpretation criteria
   a. 8–10 is normal (in absence of oligohydramnios)
   b. 6 is equivocal, repeat testing
   c. 4 or less is considered abnormal

4. Modified BPP, NST, and AFI—see the section titled “Post-term pregnancy” later in this chapter

• Percutaneous umbilical blood sampling (PUBS) or cordocentesis

1. Definition—process in which a needle is introduced under real-time ultrasound through the maternal abdomen and then into the umbilical cord; blood is then aspirated or blood and/or medications are introduced into the fetus

2. Usually performed after 20 weeks

3. Used for prenatal diagnosis—Rh (anti-D) disease, fetal infections, blood factor abnormalities, chromosomal or genetic disease, fetal hypoxia assessment

4. Used to treat the fetus—fetal transfusion, administer drug therapy

5. Concerns
   a. Similar to amniocentesis and CVS procedures
   b. Must be performed by a skilled individual able to secure immediate delivery and appropriate level of neonatal care

• Methods to assess fetal lung maturity

1. Respiratory distress syndrome (RDS) is a major problem associated with preterm birth

2. Assessment of fetal lung maturity is accomplished by assessing the amniotic fluid

3. Different tests may be used to assess the factors that help prevent atelectasis

4. Prior to 39 weeks’ gestation, there should be an evaluation of fetal lung maturity if labor induction or cesarean delivery is electively scheduled to help prevent iatrogenic prematurity and RDS
   a. Lecithin/sphingomyelin ratio (L/S)
      1. Lecithin is elevated after 35 weeks
      2. Sphingomyelin remains fairly constant
      3. Ratio of 2:1 or greater is indicative of fetal lung maturity except in diabetes
      4. L/S ratio may also not be accurate in hydrops fetalis and nonhypertensive glomerulonephritis

Selected Obstetric Complications

• Abuse

1. Substance abuse
   a. Substances with known potential for abuse/addiction
      1. Alcohol—16.3 million adults ages 18 and older had an alcohol use disorder (AUD), which included 10.6 million men and 5.7 million women (National Institute of Alcohol Abuse and Alcoholism, 2017); more than 3 million women in the United States are at risk for exposing their developing fetus to alcohol because they are consuming alcohol, engaging in sexual intercourse and not using contraception (Centers for Disease Control and Prevention, 2016b)
      2. Nicotine—71 million (28.6% of U.S. population) currently use tobacco products
      3. Illegal drugs—prevalence in 2007 was 19.9 million in United States (8.0%) reporting use in past month
         (a) Cocaine
         (b) Hallucinogens
         (c) Heroin
         (d) Marijuana
         (e) Nonmedical use of prescription psychotherapeutics and pain relievers
   b. Historical evolution of the concept of alcohol use in the United States
      1. After World War II, dominant view linked excessive use of prescription drugs, alcohol, and use of illicit drugs with emotional instability, weak will, and poor character
      2. Jellinek’s 1960 disease model for alcoholism made it a chronic, relapsing disease with a genetic component
      3. Major definition shift paved the way for the Alcoholics Anonymous approach to treatment
   c. Substance abuse in pregnancy
      1. Prevalence—according to the Substance Abuse and Mental Health Services Administration National Survey on Drug Use and Health (Substance Abuse and Mental Health Services Administration, 2014)
         (a) Illicit drug use 5.4%
         (b) Alcohol use 9.4%
         (c) Binge drinking 2.3%
         (d) Heavy drinking 0.4%
         (e) Tobacco use 15.4%
d. Factors associated with increased risk for substance abuse in pregnancy include
(1) Lack of education
(2) Low self-esteem
(3) Depression
(4) Family problems and/or family history of substance abuse
(5) Financial problems and poverty
(6) Abusive relationships
(7) Feelings of hopelessness
(8) Drug-abusing partner

e. Maternal medical and obstetric complications of substance abuse include
(1) Smoking
   (a) Maternal effects—preeclampsia, abruption placentae, placenta previa, spontaneous abortion, ectopic pregnancy, and PROM
   (b) Infant effects—IUGR, premature birth, and small for gestational age
(2) Alcohol (National Institute on Alcohol Abuse and Alcoholism)
   (a) Maternal effects—interferes with brain’s communication pathways; disrupts mood and behavior; increases difficulty with thinking clearly and having proper body coordination; increases further strain on maternal liver, pancreas, and heart
   (b) Infant effects—alcohol use in pregnancy can cause fetal alcohol spectrum disorders (FASDs); FASDs are physical, behavioral, and intellectual disabilities that last a lifetime; up to 1 in 20 U.S. schoolchildren may have FASD: low birthweight (LBW) and growth; problems with heart, kidneys, and other organs; damage to parts of the brain, which leads to behavioral and intellectual disabilities such as difficulty with attention and hyperactivity
(3) Illicit drugs
   (a) Effects less well known, and knowledge of long-term implications is limited
   (b) Research findings confounded by social and economic factors
   (c) Use of two or more drugs further confounds the reality
   (d) Maternal effects of heroin and methadone—eclampsia, placental abruption, IUGR, intrauterine death, PPH, preterm labor, PROM
   (e) Infant effects—jitteriness, hyperreflexia, restlessness, sleeplessness, poor feeding pattern, vomiting, diarrhea, shrill cry

f. Screening
(1) Toxicology screen; most commonly done on maternal urine; more recently, meconium, infant hair sample, amniotic fluid, cord tissue
(2) History—more information gathered regarding length of time and quantity of use
(3) Combination of both


g. Screening tools for alcohol use
(1) CAGE
   C—have you felt the need to cut down on your drinking?
   A—have people annoyed you by criticizing your drinking?
   G—have you ever felt bad or guilty about your drinking?
   E—have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover (eye-opener)

(2) TWEAK
   (a) Tolerance—how many drinks can you hold?
   (b) Worried—have close friends or relatives worried or complained about your drinking in the past year?
   (c) Eye-openers—do you sometimes take a drink in the morning when you first get up?
   (d) Amnesia—has a friend or family member ever told you about things you said or did while you were drinking that you could not remember?
   (e) Cut down—do you sometimes feel the need to cut down on your drinking?

h. Goals
(1) Ideal—stop using harmful substances
(2) Reduce quantity and types of substances used
(3) Mobilize resources to support and encourage
(4) Drug rehabilitation

i. Ethical considerations—who should be screened?
(1) Universal and mandatory versus none for anyone
(2) Screening of those with positive history or who exhibit signs of use

j. Legal implications
(1) Mandatory reporting to child protective services
(2) Possible loss of infant
(3) Criminal prosecution of woman

2. Intimate partner abuse/violence against women (VAW)

a. Incidence of VAW—more than half of all women experience some form of abuse at some point in their lives

b. Screening techniques for ascertaining the presence of VAW; essential questions asked during history taking include
(1) Have you ever been emotionally or physically abused by your partner or someone important to you?
(2) Within the past year, have you been hit, slapped, kicked, shoved, or otherwise hurt by anyone?
(3) Have you ever been hit, slapped, kicked, or otherwise physically hurt while you were pregnant?

c. Definitions of VAW
(1) Physical
   (a) Pushes, slaps, punches
   (b) Locks woman in or out of the house
   (c) Refuses to buy food
   (d) Refuses access to medical care
   (e) Destroys property or pets
   (f) Abuses children
(2) Emotional
   (a) Engages in name calling or insults
   (b) Isolates from family and friends
   (c) Publicly humiliates
   (d) Makes all decisions
   (e) Withholds affection
(3) Sexual
   (a) Treats women as sex objects
   (b) Forces sexual acts with self or others
   (c) Jealous anger with accusations
   (d) Withholds sex and affection
   (e) Engages in sadistic sexual acts

Selected Obstetric Complications
d. Diagnosis of abuse
   (1) History
      (a) Depression or suicide attempts
      (b) Substance abuse
      (c) Childhood abuse (sexual or physical)
      (d) Multiple injuries
      (e) Complaints of chronic pain
      (f) Repeated spontaneous abortions (SAB), threatened abortions (TAB)
      (g) STI(s)
   (2) Physical
      (a) Assessing for injuries—multiple bruises in various stages of recovery; proximal versus distal: proximal tends to be intentional; hidden injuries: breasts, abdomen, back, and so on
      (b) Treatment delays—old scars or bruises visible
      (c) Patterned injuries—without reasonable certainty can determine what kind of object caused injury (e.g., bite marks)
      (d) Physical findings inconsistent with history
      (e) Genital trauma, vaginismus
      (f) Poor weight gain in pregnancy
   (3) Others
      (a) Partner appears "overprotective"
      (b) Missed appointments

 e. Effect of pregnancy on VAW

 f. Risks in pregnancy in the situation of violence/abuse, to the woman and fetus

 g. Management
    (1) Data collection
    (2) Forensic examination
    (3) Safety
    (4) Counseling
    (5) Acute intervention
    (6) Long-term aid
    (7) Referral

 h. Community resources for victims of violence/abuse

 i. Legal and emergency issues related to domestic violence

• First-trimester bleeding

  1. Definition—bleeding occurring within the first 12 weeks of pregnancy
     a. Forty percent of women have some bleeding in the first trimester
     b. Eighty percent of spontaneous abortions occur in the first 12 weeks
     c. Ninety percent of pregnancies with bleeding continue to term after FHT observed

  2. Differential diagnosis
     a. Implantation bleeding
     b. Threatened abortion
     c. Ectopic pregnancy

     d. Cervicitis
     e. Cervical polyps
     f. Vaginitis
     g. Trauma/intercourse
     h. Disappearing twin
     i. Autoantibody/autoimmune disorder

  3. Diagnosis
     a. Pelvic examination
        (1) Speculum examination to visualize the cervix
        (2) Bimanual examination to assess uterus and adnexa for size and tenderness
     (3) Laboratory diagnosis
        (a) Serum hCG is positive eight to nine days after fertilization
        (b) Beta-human chorionic gonadotropin (b-hCG) doubles every 48 hours with normal intrauterine pregnancy (IUP)
        (c) b-hCG increases by only one-third when an ectopic pregnancy exists

     (4) Rule of 10
        (a) b-hCG equals 100 at time of missed menses
        (b) b-hCG is 100,000 at 10 weeks (peak)
        (c) b-hCG 10,000 at term
        (d) b-hCG elimination half-life about 24 hours
        (e) Ninety percent of eptopics have b-hCG less than 6500

  4. Treatment—depends on etiology

    • Spontaneous abortion

      1. Types of abortion
         a. Spontaneous abortion—occurring without apparent cause
         b. Threatened abortion—appearance of signs and symptoms of possible loss of the fetus (i.e., vaginal bleeding with or without intermittent pain)
         c. Inevitable abortion—cervix is dilating; uterus will be emptied
         d. Incomplete abortion—an abortion in which part of the products of conception has been retained in the uterus
         e. Complete abortion—all the products of conception have been expelled
         f. Missed abortion—the fetus died before completion of 20 weeks' gestation, but products of conception are retained for a prolonged period of time (two or more weeks)
         g. Habitual abortion—three or more consecutive abortions

      2. Etiology—fetal factors
         a. Abnormal development of zygote such as from chromosomal abnormalities is responsible for about 60%
         b. Autosomal trisomy is the most frequently identified chromosomal anomaly, followed by Turner's syndrome

      3. Etiology—maternal factors
         a. Incidence increases with parity and/or short interconceptional period
         b. Incidence increases with maternal and paternal age

      4. Common causes of spontaneous abortion
         a. Anatomic anomalies
         b. Infections
         c. Immune factors, including autoimmune clotting disorders
         d. Endocrine effects
8. Clinical picture
   a. Severe abdominal pain
   b. Cervical motion tenderness
   c. Free fluid on ultrasound
   d. Cul-de-sac fullness
   e. Shoulder pain second to diaphragmatic irritation
   f. Vertigo or fainting

9. Diagnosis
   a. Physical examination
   b. Serum b-hCG (90% of ectopics have b-hCG less than 6500; abnormal interval increases)
   c. Ultrasound
   d. Culdocentesis
   e. Laparoscopy

10. Differential diagnosis
    a. Pelvic inflammatory disease (PID)
    b. Ovarian cyst
    c. Appendicitis

11. Management
    a. Consult and transfer to medical management
    b. Tubal preservation is the goal
    c. Salpingectomy/salpingostomy/tubal resection
    d. Methotrexate
    e. RhoGAM for Rh-negative women

• Inevitable or incomplete abortion
  1. Surgical dilation and curettage (D&C)
  2. Chemical D&C
  3. Observant management
  4. Emotional support and anticipatory guidance

• Threatened abortion or disappearing twin
  1. Pelvic rest
  2. Emotional support and anticipatory guidance

• Ectopic pregnancy
  1. Definition—implantation of the blastocyst anywhere other than the endometrium
  2. Ninety-five percent of ectopic pregnancies occur in the fallopian tube
  3. Second leading cause of maternal death in United States
  4. Occurs in about 1 per 85 pregnancies; rate is highest in the 35- to 44-year age group

5. Etiology
   a. STI(s)—especially chlamydia and gonorrhea
   b. Therapeutic abortion followed by infection
   c. Endometriosis
   d. Previous pelvic surgery
   e. Failed bilateral tubal ligation
   f. Mechanical—problems with tubes such as scarring
   g. Functional—menstrual reflux, hormonal alteration of tubal motility

6. Sites for ectopic
   a. Ampulla—78% of ectopics
   b. Isthmus—12% of ectopics
   c. Interstitial—2% of ectopics
   d. Fimbria—less than 1% of ectopics
   e. Other sites—abdominal, ovarian, and broad ligament

7. Symptoms
   a. Amenorrhea but frequently has some vaginal spotting
   b. Lower pelvic and/or abdominal pain, which is unilateral
   c. Unilateral tender adnexal mass
   d. Some have no symptoms

• Hydatidiform mole
  1. Incidence—1:1,500 to 1:2,000
  2. Highest incidence at beginning and end of reproductive years, with greatest incidence after age 45
  3. Symptoms
     a. Abnormal uterine bleeding
     b. Size/dates discrepancy
     c. Lack of fetal activity
     d. HG
     e. Gestational hypertension (GHTN) before 20 weeks
     f. Passage of vesicular tissue

4. Diagnosis
   a. Ultrasound
   b. Serum b-hCG

5. Management
   a. Uterine evacuation by suction curettage
   b. Close surveillance for persistent trophoblastic proliferation or malignant changes
   c. Recommend avoidance of pregnancy for one year
   d. Serial b-hCG levels every two weeks until normal, then once a month for six months, then every two months for one year
   e. Chest radiograph

• Second-trimester bleeding—bleeding is less common
  1. Midtrimester spontaneous abortion
     a. Etiology
        (1) May be associated with autoimmune disorders
        (2) May be related to cocaine use
        (3) May be related to anatomic or physiologic factors
2. Incompetent cervix
   a. Symptoms
      (1) Painless dilation
      (2) Bloody show
      (3) Spontaneous rupture of membranes
      (4) Vaginal/pelvic pressure
   b. Risk factors
      (1) Previous midtrimester loss
      (2) Cervical surgery
      (3) Diethylstilbestrol (DES)
   c. Treatment
      (1) Consult
      (2) Cervical cerclage after 12–14 weeks
      (3) Success rate of 80–90%
      (4) Risk of ruptured membranes or infection
      (5) Monitor cervical length via transvaginal ultrasound

3. Placental anomalies
   a. Low-lying placenta
      (1) One-third of women have low-lying placenta in first trimester
      (2) Only 1% of women have previa in the third trimester
   b. Partial abruption
      (1) May resolve
      (2) May reabsorb
   c. Diagnosis
      (1) Ultrasound
      (2) Consult as needed

• Third-trimester bleeding
  1. Incidence—4% of all pregnancies
  2. Never perform a digital vaginal examination on a woman's cervix in the presence of third-trimester bleeding unless certain there is no previa!
  3. Placenta previa—responsible for 20% of third-trimester bleeds
     a. Definition—placenta is located over or next to the internal cervical os; may be partial (not totally covering the os), marginal (palpable at margin of os), or complete (completely covering the os)
     b. Partial abruption
        (1) May resolve
        (2) May reabsorb
     c. Diagnosis
        (1) Ultrasound
        (2) Consult as needed

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4. Placental abruption (cause of 30% of third-trimester bleeds)
   a. Definition—premature separation of the placenta from the uterus that may be partial or complete
   b. Risk factors
      (1) Hypertension—chronic or gestational
      (2) Trauma
      (3) Smoking
      (4) Cocaine use
      (5) Multiparity
      (6) Uterine anomalies or tumors
   c. Signs and symptoms
      (1) Vaginal bleeding
      (2) Uterine tenderness and rigidity
      (3) Contractions or uterine irritability and/or tone
      (4) Fetal tachycardia or bradycardia
   d. Complications
      (1) Shock
      (2) Fetal compromise or death
      (3) Disseminated intravascular coagulation (DIC)
   e. Diagnosis
      (1) Clinical evaluation
      (2) Fetal monitoring
      (3) Ultrasound
   f. Management
      (1) “Get help”
      (2) Monitor clotting studies and Hgb/Hct, platelets
      (3) Stabilize mother
      (4) Effect delivery as indicated by fetal or maternal condition

• Selected problems during pregnancy
  1. Birth defects or anomalies—common terms and definitions
     a. Malformation—the fetus or structure is genetically abnormal (e.g., limb contracture resulting from diastrophic dysplasia)
     b. Deformation—a genetically normal fetus develops in an abnormal uterine environment, causing structural changes (e.g., oligohydramnios causing limb contractures)
     c. Disruption—a genetically normal fetus suffers an insult, resulting in disruption of normal development (e.g., early amnion rupture causing limb deformities)
     d. Syndrome—multiple abnormalities have the same cause (e.g., trisomy 18)
     e. Sequence—abnormalities occurred sequentially as result of one insult (e.g., oligohydramnios leading to pulmonary hypertension, limb contractures, and facial deformities)
     f. Association—set of abnormalities that frequently occur together but have no linked etiology
2. Genetic abnormalities
   a. Critical concept definitions
      (1) Phenotype—the expression of genes present in an individual (e.g., eye color, blood type)
      (2) Genotype—the total hereditary information present in an individual; the pair of genes for each characteristic
   b. Definitions of critical patterns of inheritance
      (1) Single-gene (Mendelian) disorders
         (a) A mutation in a single locus or gene, in one or both members of a gene pair
         (b) Incidence—0.4% by age 25; 2% during lifetime
      (2) Autosomal dominant—when only one member of a gene pair determines the phenotype (e.g., \( BRCA1 \) and \( BRCA2 \) breast cancer)
      (3) Autosomal recessive—trait is expressed only when both copies of the gene are the same (e.g., cystic fibrosis, sickle cell anemia)
      (4) Sex-linked
         (a) X-linked diseases are usually recessive (e.g., color blindness, hemophilia)
         (b) Y-linked diseases relate to sexual determination, cellular functions, and bone development
   c. Inborn errors of metabolism—autosomal recessive disease resulting from absence of an enzyme causing incomplete metabolism of proteins, fats, or sugars (e.g., phenylketonuria [PKU])
   d. Definition of essential terms
      (1) Autosome—any chromosome other than sex (X or Y) chromosomes
      (2) Genome—the complete set of chromosomes, or the entire genetic information present in a cell
      (3) Euploidy—state of complete sets of chromosomes
      (4) Aneuploidy—state of having an abnormal number of chromosomes
      (5) Polyploidy—abnormal number of haploid chromosome complements
      (6) Deletion—portion of a chromosome that is missing
      (7) Ring chromosome—when deletions occur at both ends of the chromosome, the ends may untie to form a ring
      (8) Isochromosomes—composed of either two short arms or two long arms of the chromosome fused together
   e. Trisomy 21—Down syndrome, the most common, nonlethal trisomy
      (1) Incidence—1 in 800–1,000 newborns
      (2) Etiology—almost 95% due to nondisjunction of maternal chromosome 21
      (3) Signs and symptoms
         (a) Marked hypotonia
         (b) Tongue protrusion
         (c) Small head
         (d) Flattened occiput
         (e) Flat nasal bridge
         (f) Epicanthal folds and slanting palperbral fissures
         (g) Nuchal skin fold
         (h) Short, stubby fingers
         (i) Single palmar crease
         (j) Fifth fingers are curved inward
         (k) IQ range—25–50
      (4) Recurrence risk—1% until age-related risk status reached after age 35
   f. Genetic counseling
      (1) Goals for first step—to educate the woman and her family about testing options, indications for and implications of results
      (2) Goals after abnormal screen—to inform woman of options to address the results
      (3) Indications for genetic studies
         (a) General screening for anomalies (e.g., neural tube defect, trisomy 21)
         (b) History of birth defects or mental retardation
         (c) Family history of genetic disorders
         (d) Exposure to teratogens
         (e) Ingestion of medications in early pregnancy known to be teratogenic (i.e., seizure prevention drugs)
         (f) Has increased likelihood because of age or ethnic roots

3. Sexually transmitted infections (STIs) (Centers for Disease Control and Prevention, 2015)
   a. Definition—transmission of pathogens through sexual activities and behaviors
   b. Incidence—20 million new infections annually; more than a total of 110 million new and existing STI cases in the United States (Centers for Disease Control and Prevention, Division of STD Prevention, 2013b)
   c. Diseases characterized by genital ulcers
      (1) Syphilis
         (a) Incidence—23,872 cases of primary and secondary cases of syphilis reported in the United States (Centers for Disease Control and Prevention, 2015)
         (b) Clinical manifestations—primary syphilis
            i. Incubation—10–90 days, usually less than six weeks
            ii. Primary genital lesion difficult to see; goes unnoticed—cervical chancre more common in pregnancy
            iii. Painless firm ulcer with raised edges
            iv. Heals after two to six weeks; may have nontender enlarged inguinal lymph nodes
         (c) Clinical manifestations—secondary syphilis
            i. Variable skin rash appears 4–10 weeks after chancre heals
            ii. Not noticed in 25%—may be limited to genitalia
            iii. Condylomata lata—elevated areas that may cause vulvar ulcerations
            iv. Alopecia sometimes occurs
         (d) Etiology
            i. Chronic infection—spirochetes cause lesions in major organs
            ii. Recent infection more likely to affect fetus
            iii. Placental changes—large, pale
         (e) Diagnosis
            i. VDRL or RPR—first prenatal visit
            ii. Fluorescent treponemal antibody absorption test (FTA-ABS) or microhemagglutination assay for antibodies to \( Treponema pallidum \) (MHA-TP) confirms nonspecific VDRL/RPR
            iii. Repeat, or do a nontreponemal screening at time of delivery
(f) Treatment—98% effective
   i. Penicillin—dual purpose in pregnancy; eradicate maternal infection and prevent infection in the newborn
   ii. Early syphilis—benzathine penicillin G 2.4 million units IM; some recommend a second dose in one week, particularly for secondary stage or in third trimester
   iii. Syphilis of more than one year duration—benzathine penicillin G 2.4 million units IM weekly × 3 doses
(g) Penicillin allergy
   i. Skin test to confirm allergy
   ii. Desensitize, then treat as above
(h) Congenital syphilis or stillbirth—may be only sign of maternal infection
   i. Incidence—historically accounted for 30% of all stillbirths
   ii. United States 1998—30 per 100,000 births
(i) Jarisch-Herxheimer reaction
   i. Acute febrile reaction, often with headache and myalgia occurring within first 24 hours of treatment initiation; not an allergic reaction; most common in early syphilis treatment
   ii. Might induce early labor or cause fetal distress; should not prevent or delay therapy
   iii. Advise pregnant women of this possible reaction
   iv. May use antipyretics for symptoms; resolves in 24 hours
(2) Herpes simplex virus (HSV)
   (a) Incidence—not a reportable condition; 299,000 initial visits to physicians’ offices for HSV infection in 2016 (Center for Disease Control and Prevention, 2016c)
   (b) Signs and symptoms—primary infection
      i. Incubation—three to six days
      ii. Pruritic papular eruption that becomes painful and vesicular; multiple lesions
   iii. Inguinal adenopathy
   iv. Transient flulike symptoms
   v. By two to six weeks, all signs and symptoms are gone
   (c) Signs and symptoms—recurrent infection
      i. Reactivation results in virus shedding
      ii. Signs and symptoms are less intense but occur at same site
   (d) Diagnosis
      i. Viral culture or polymerase chain reaction (PCR) detection
      ii. Type-specific serologic tests
   (e) Treatment
      i. Antivirals (acyclovir, valacyclovir)—primary or first episode infection, symptomatic recurrent episode; daily suppression from 36 weeks’ gestation until delivery
      ii. Analgesics and topical anesthetics
   (f) Management of birth—cesarean delivery indicated only if woman has active genital lesions or prodromal symptoms
(3) Human papillomavirus (HPV)
   (a) Incidence—38,793 average number of cases of HPV-associated cancers in the United States per year (Veins et al., 2016) and 465,000 reported cases of initial visits to physicians’ offices related to genital warts (Centers for Disease Control and Prevention, 2016h)
   (b) HPV type and associated conditions
      i. HPV-16—cervical, vaginal, and vulvar neoplasia
      ii. HPV-6, 11, also 16, 18, 30s, 40s, 50s, 60s—condylomata acuminata
      iii. HPV-16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 66—cervical intraepithelial neoplasia and cancer
   (c) Treatment
      i. Imiquimod, podophyllin, podofilox are contraindicated in pregnancy
      ii. Cryotherapy, trichloracetic acid (TCA), surgical removal if indicated
   (d) Management of birth—cesarean delivery should not be used solely to prevent transmission to newborn; cesarean delivery may be indicated if genital warts obstruct pelvic outlet or if vaginal delivery would result in excessive bleeding
   d. Diseases characterized by urethritis/cervicitis
   (1) Gonorrhea
      (a) Incidence—123.9 cases per 100,000 population (including all age groups); highest in 20- to 24-year age group, in which the rate of gonorrhea is 539.1 for men and 546.9 for women per 100,000 population (Centers for Disease Control and Prevention, 2016d)
      (b) Prevalence in pregnancy—varies, with high at 7%
      (c) Risk factors—single, adolescence, poverty, drug abuse, prostitution, concomitant STI(s), lack of antepartal care
      (d) GC is marker for CT
      (e) Diagnosis—screen at first visit; repeat at 28 weeks in high-risk groups
      (f) Clinical significance in pregnancy—associated with septic spontaneous or induced abortion
   (g) Treatment
      i. Recommended:
         Ceftriaxone 250 mg IM × 1
         PLUS
         Azithromycin 1 g PO × 1
      Alternative regimen, if ceftriaxone not available:
         Cefixime 400 mg PO × 1
         PLUS
         Azithromycin 1 g PO × 1
      If the patient has severe cephalosporin allergy:
         Azithromycin 2 g PO × 1
      ii. Re-testing in 3 months regardless of partner treatment
      iii. For heterosexual men and women, expedited partner treatment with cefixime 400 mg and azithromycin 1 g can be delivered to the partner by the patient, a disease investigation specialist, or a collaborating pharmacy as permitted by law
      iv. Concomitant treatment for CT if infection is not ruled out
   (2) Chlamydia trachomatis (CT)
      (a) Incidence—478.8 cases per 100,000 population (including all age groups) (Centers for Disease Control and Prevention, 2016i); most common reportable STI; highest in 20- to 24-year age group, in which the rate
(3) Vulvovaginal candidiasis (VVC)
(a) Treatment of uncomplicated VVC in pregnancy—only topical treatment with azoles (butoconazole, clotrimazole, miconazole, terconazole, nystatin) recommended for seven days
(b) Treatment of recurrent or severe VVC in pregnancy—may require longer duration of therapy with topical azoles

4. Intrauterine growth restriction (IUGR) and small for gestational age (SGA) (Gabbe et al., 2016)
a. Definitions—intrauterine growth restriction (IUGR), fetal growth restriction (FGR), and small for gestational age (SGA), are terms used interchangeably to describe a fetus or newborn whose size is smaller than the norm.
(1) IUGR is a prenatal diagnosis based on ultrasound measurements used to describe impaired or restricted intrauterine growth and is considered a pathologic process
(2) SGA is a neonatal diagnosis and describes an infant who falls below the 10th percentile
(3) LBW is an old term from the 1960s used to classify growth by an absolute weight: < 2,500 g

b. Differentiation
(1) The genetic design of a constitutionally small infant (parents are also small)
(2) LBW secondary to poor nutrition
c. Incidence—3–8%; leads to 18% mortality rate
d. Symmetric growth restriction
(1) Insult occurs early in pregnancy, likely in first trimester → resulting in decreased in number and size of cells → affects growth pattern for body and head → symmetric reduced growth
(2) Caused by
(a) Congenital infections
(b) Chromosomal abnormalities
(c) Maternal drug use—tobacco, alcohol, Dilantin (phenytoin), cocaine, heroin
(3) Increased risk of adverse long-term sequelae
e. Asymmetric growth restriction
(1) Appears later in the pregnancy
(2) Asymmetry is caused by two main reasons:
(a) Reduced nutrition to fetus → diminished glycogen stores → decreased liver volume → decrease in AC
(b) Abnormalities in uteroplacental perfusion → increased right cardiac afterload → cardiac output diverted toward left ventricle → increase in blood and nutrient supply to vital organs of the body 00E0 asymmetrical head-sparing appearance
(3) Caused by
(a) Maternal factors
   i. Hypertension
   ii. Anemia
   iii. Collagen disease
   iv. Insulin-dependent diabetes mellitus (IDDM)
(b) Placental factors
   i. Previa
   ii. Abruptio
   iii. Malformations
   iv. Infarctions
Management
(1) Discuss risks/challenges
(2) Diet counseling
(3) Ultrasound for EFW
(4) Carefully assess clinical pelvimetry
(5) Consult
(6) Monitor for shoulder dystocia

5. Large for gestational age (LGA)/macrosomia (Gabbe, 2016)

a. Definition—in United States, babies weighing more than 4,000 g at birth (some studies define LGA as > 4,500 g) or over the 90th percentile in weight for gestational age

b. Risk factors
(1) Ethnic/racial origins
(2) Obesity
(3) Previous LGA/macrosomic neonate
(4) Previous shoulder dystocia
(5) Size of the father
(6) Birthweight of both the mother and the father
(7) Diabetes or history of gestational diabetes
(8) Previous uterine myomata
(9) Multiparity

c. Physical examination
(1) Fundal height
(2) EFW and palpation of fetal parts
(3) Maternal body habitus

d. Differential diagnosis
(1) Inaccurate dating
(2) Polyhydramnios
(3) Multiple gestation
(4) Diabetes
(5) Uterine fibroids

e. Signs and symptoms
(1) Painful or painless uterine contractions
(2) Pelvic pressure
(3) Menstrual-like cramps
(4) Watery or bloody vaginal discharge
(5) Low back pain

f. Markers for predicting preterm birth
(1) Fetal fibronectin (fFN) screening (American College of Obstetricians and Gynecologists, 2016a)
(a) Has been associated with PTB; however, no randomized control trial exists
(b) Positive predictive value of a positive fFN test is poor
(c) fFN test results alone should not be used in the decision process in managing clinical situations surrounding PTB
7. Multiple gestation—identify as early as possible
      (1) Twins—increased from 18.9 to 33.9 per 1,000 births between 1980 and 2014
      (2) Triplets and higher-order multiples—reached a record number in 1998 at the rate of 193.5 per 1,000 births; has dropped 40% to 113.5 per 1,000 births in 2014
     b. Definitions
        (1) Zygosity—the condition of zygotes as it relates to twins
           a) Monozygotic—4/1,000 worldwide
           b) Dizygotic—8/1,000 worldwide
        (2) Chorionicity—refers to placentation; most reliable when assessed in the first trimester
        (3) Accounts for fewer than 1% of births but more than 10% of perinatal mortality
        (4) Incidence varies with race and increases with age, parity, and heredity
     c. Dizygotic (DZ) (fraternal)—fertilization of two separate ova by two separate sperm
        (1) Use of fertility drugs increases chance
        (2) Clomid—1:10 risk
        (3) Gonadotropins—1:5 risk
        (4) In vitro fertilization (IVF) increases risk
     d. Monozygotic (MZ) (identical)—division of a single egg fertilized by a single sperm
        (1) Risk factors are unknown
        (2) Time of ovum division determines membrane development
           a) Days 0–3—dichorionic, diamniotic (30%)
           b) Days 4–8—monochorionic, diamniotic (68%)
           c) After day 8—monochorionic, monoamniotic (2%)
           d) After day 13—conjoined twins (< 1%)
     e. Family history increases risk
     f. Clinical skills are important to identify multiple pregnancies
     g. Signs and symptoms
        (1) Fundal height greater than dates
        (2) Earlier or exaggerated discomforts of pregnancy
        (3) Two distinct heartbeats
        (4) Outline of more than one fetus
        (5) Palpation of multiple small parts
        (6) Ultrasound of two or more fetuses
     h. Differential diagnosis
        (1) Macrosomia
        (2) Uterine, ovarian, or pelvic mass
        (3) Distended bladder
        (4) Polyhydramnios
        (5) Hydatidiform mole
        (6) Inaccurate dates
     i. Potential complications
        (1) Hyperemesis
        (2) Preterm labor, PROM, preterm birth
           a) Thirty-six percent deliver before 36 weeks’ gestation
           b) Fifty percent deliver before 37 weeks’ gestation
        (3) LBW—55% are less than 5 lb
        (4) Twin-to-twin transfusion
        (5) Oligohydramnios
        (6) Perinatal asphyxia
        (7) Preeclampsia
        (8) Postpartum hemorrhage
        (9) Pyelonephritis
        (10) Maternal anemia
(11) Placental problems
   (a) Previa
   (b) Abruption
(12) Fetal anomalies
j. Antepartum management
   (1) Consult
   (2) Discuss risks and benefits of management, serial ultrasounds, and regular fetal surveillance
   (3) Counsel about maternal nutrition, rest, exercise, and stress
      (a) Increased nutritional needs
      (b) Increased iron
      (c) Small frequent meals
      (d) Exercise limitations and bed rest are both controversial
   (4) Provide emotional support
   (5) Evaluate weekly for weight, fetal growth, signs/symptoms of preterm labor, and elevated BP
   (6) Preterm labor monitoring
      (a) Possible administration of glucocorticoids for lung maturity
      (b) Tocolytic therapy
      (c) Birth plan should include availability of physician consultant for birth

8. Malpresentations of significance during the prenatal period—breech and shoulder (transverse lie)
a. Concept—the presentation determines the presenting part
b. Breech—longitudinal lie with buttocks in the lower pole
   (1) Incidence
      (a) Fourteen percent between 29 and 32 weeks
      (b) 3.5% at term
   (2) Variations
      (a) Frank—legs are extended up over the fetal abdomen and chest
      (b) Complete—legs are flexed at the hips and knees
      (c) Footling or incomplete—one or both feet or knees are lowermost
   (3) Etiology—some situation that distorts the shape of the fetus or the uterus
      (a) Uterine septum
      (b) Fetal anomaly (e.g., hydrocephaly)
      (c) Fetal attitude (e.g., extension of spinal column or neck)
      (d) Placenta previa
      (e) Conditions resulting in abnormal fetal movement or muscle tone
   (4) Diagnosis
      (a) Abdominal examination—Leopold’s maneuvers
         i. Fetal part in the fundus is round, hard, freely moveable, and ballotable
         ii. Find back and small parts
         iii. Part in lower pole is large, nodular body
         iv. Determine degree of engagement and reaffirm previous findings by confirming lack of cephalic prominence in lower pole
      (b) Vaginal findings compared to vertex findings
         i. No fetal skull sutures or fontanelles
         ii. Round indentation (anus)
         iii. Tissue texture is softer than head, if complete breech; toes, feet, or knees may be palpated if footling

   (5) Treatment
      (a) External cephalic version
      (b) Moxibustion
      (c) Anticipatory guidance regarding plan for version as well as plans for persistent breech
   c. Shoulder—transverse lie in which the shoulder or arm is found in the lower pole
      (1) Incidence—0.4%
   (2) Etiology
      (a) Multiparity
      (b) Placenta previa
      (c) Polyhydramnios
      (d) Uterine anomalies

a. Definitions
   (1) Preeclampsia—pregnancy-specific hypertensive disorder. Associated with symptoms such as headaches, visual disturbances, epigastric pain, and rapid edema development; the diagnosis of preeclampsia includes the development of blood pressure greater than or equal to 140/90 mm Hg on two occasions at least four hours apart after 20 weeks of gestation or a blood pressure > 160/100 (confirmed within a few minutes) in a woman who was previously normotensive and proteinuria greater than or equal to 300 mg per 24-hour urine collection or protein/creatinine ratio greater than or equal to 0.3 or, if other quantitative methods are unavailable, a dipstick result of 1+ OR in the absence of proteinuria, new-onset hypertension with the new onset of the following severe features:
      (a) Thrombocytopenia—platelet count < 100,000/ microliter
      (b) Renal insufficiency—serum creatinine > 1.1 mg/dL
         or doubling of serum creatinine concentration without renal disease
      (c) Impaired liver function—doubling of normal levels of liver transaminases
      (d) Pulmonary edema
      (e) Cerebral or visual symptoms
   (2) Eclampsia—seizures that cannot be attributed to other causes in a woman with preeclampsia
   (3) Chronic hypertension—BP 140/90 mm Hg or higher diagnosed before pregnancy, before 20 weeks’ gestation, or after 12 weeks postpartum
   (4) Chronic hypertension with superimposed preeclampsia—chronic hypertension with new-onset proteinuria at greater than 300 mg in 24 hours, but no proteinuria before 20 weeks’ gestation; or sudden increase in proteinuria or blood pressure or platelet count of less than 100,000/mm³ in women with hypertension (HTN) and proteinuria before 20 weeks’ gestation
   (5) Gestational Hypertension—new-onset blood pressure elevation after 20 weeks of gestation, without proteinuria. If blood pressure does not return to normal in postpartum period, consider changing diagnosis to chronic hypertension
   (6) HELLP syndrome—Hemolytic anemia, Elevated Liver enzymes, and Low Platelet count. May occur antepartum or postpartum.
b. Management of hypertension in pregnancy
   (1) Consult—will need to co-manage and/or transfer care
   (2) For pregnant women with chronic hypertension being treated
       with antihypertensive medications, it is suggested that BP
       levels be maintained between 120/80 and 160/105 mm Hg
   (3) For women with chronic hypertension who are at a great
       risk for adverse pregnancy outcomes, it is recommended
       to place these women on low-dose aspirin (60–80 mg) PO
       daily starting in the late first trimester
   (4) For women with chronic hypertension, without other
       maternal or fetal complications, delivery before 38 weeks is
       not recommended
   (5) Recommended first choice of antihypertensives for women
       who require pharmacologic therapy includes labetalol,
       nifedipine, and methyldopa
   (6) Close surveillance of women with preeclampsia but without
       severe features includes assessment of maternal symptoms,
       daily fetal movement counts, twice-weekly blood pressure
       monitoring, weekly serologic assessment of platelets and
       liver enzymes
   (7) For women with preeclampsia with severe features, mag-
       nesium sulfate for the prevention of eclampsia is recom-
       mended in the intrapartum-postpartum period

c. Risk factors
   (1) Nulliparity
   (2) Adolescent or advanced maternal age (> 35 years)
   (3) Multiple gestation
   (4) Family history of preeclampsia or eclampsia
   (5) Obesity and insulin resistance
   (6) Chronic hypertension
   (7) Limited exposure to father of baby's sperm—new partner,
       donor insemination
   (8) Antiphospholipid antibody syndrome and thrombophilia

d. Theory of causes
   (1) Abnormal trophoblast invasion
   (2) Coagulation abnormalities
   (3) Vascular endothelial damage
   (4) Cardiovascular maladaptation
   (5) Immunologic phenomena
   (6) Genetic predisposition
   (7) Dietary deficiencies or excesses

e. Antepartum management of preeclampsia
   (1) Consult diet assessment
   (2) Adequate fluids
   (3) Restricted activities (some experts advise)
   (4) Monitor BP, proteinuria, edema, weight, intake and output,
       deep tendon reflexes (DTRs), subjective symptoms

f. Laboratory tests
   (1) Creatinine
   (2) Hgb/Hct
   (3) Platelets
   (4) Liver function tests (LFTs)
   (5) Twenty-four-hour urine for protein
   (6) Creatinine clearance

g. Assessment of fetus
   (1) Daily fetal movement assessment

h. Intrapartum management
   (1) Goal to prevent seizures
   (2) Magnesium sulfate
      (a) Given IV
      (b) Used as an anticonvulsant
      (c) Side effects—flushing, somnolence
      (d) Overdosage signs and symptoms
         i. Loss of patellar reflex
         ii. Muscular paralysis
         iii. Respiratory arrest
         iv. Aggravated by decreased urine output (MgSO₄ is
            excreted by kidneys)
   (3) Antidote is calcium gluconate
   (4) Valium (diazepam) as anticonvulsant rarely used
   (5) Antihypertensives
      (a) Hydralazine IV is antihypertensive of choice in severe
         preeclampsia
      (b) Others—labetalol (beta blocker), nifedipine
   (6) Diuretics are not recommended—woman is already volume
       depleted

i. HELLP syndrome—affects 10% of patients with preeclampsia
   with severe features
   (1) Diagnosis
      (a) Hemolysis
      (b) Abnormal peripheral blood smear
      (c) Increased bilirubin at 1.2 mg/dL or greater
      (d) Elevated liver enzymes—AST, ALT, LDH
      (e) Platelet count at less than 100,000
   (2) Treatment
      (a) Plasma volume expansion
      (b) Bed rest
      (c) Crystalloids
      (d) Albumin 5–25%
      (e) Delivery as indicated
      (f) Magnesium sulfate

j. Eclampsia
   (1) Signs and symptoms—same as preeclampsia with seizures
   (2) Management—medical management
      (a) Magnesium sulfate
      (b) Administer oxygen
      (c) Safety—prevent injuries and minimize aspiration
          during seizures
      (d) Stabilize and deliver

k. Prevention of pregnancy-induced hypertension
   (1) Calcium and vitamin D supplementation if at risk and have
       low dietary intake
   (2) Low-dose aspirin—consider in high-risk pregnancies

10. Post-term pregnancy
   a. Definition—pregnancy continuing beyond 42 completed
       weeks' gestation
   b. Incidence
      (1) Six percent to 12% of pregnancies go beyond 42 weeks
      (2) Twenty-five percent of post-term pregnancies result with
          babies who have postmaturity syndrome
      (3) Associated with increased morbidity and mortality
2. Cystitis; infection of the bladder
   a. May be asymptomatic (asymptomatic bacteriuria)
   b. Usual signs of UTI (although acute cystitis is relatively rare in pregnancy)
   c. Uterine contractions
   d. Suprapubic discomfort
   e. Urgency and frequency

3. Pyelonephritis—infection of the kidneys
   a. Fever and chills
   b. Nausea and vomiting
   c. Costovertebral angle (CVA) tenderness
   d. Dysuria
   e. Flulike symptoms

4. Bacterial causes of UTIs
   a. E. coli (most common)
   b. Klebsiella
   c. Proteus
   d. Neisseria gonorrhoeae
   e. Pseudomonas

5. Screening
   a. The Infectious Disease Society of America recommends screening all pregnant women for asymptomatic bacteriuria at least one time during the pregnancy
   b. Screening typically happens between 12 and 16 weeks of gestation or on the first prenatal visit if this visit happens > 16 weeks
   c. Clean-catch urine is recommended

6. Diagnosis
   a. Symptoms
   b. Urinalysis
   c. Culture and sensitivity of more than 100,000 colonies of pathogenic bacteria
   d. If protein and white blood cells (WBCs) are present on urine dipstick, consider culture
   e. Screen every four weeks in sickle cell trait, diabetes, and previous pyelonephritis in this pregnancy

7. Management
   a. Asymptomatic bacteriuria and UTI
      (1) Treat with antibiotic even if no symptoms because risk for pyelonephritis is increased with asymptomatic bacteriuria in pregnancy
      (2) Adequate fluids
      (3) Cranberry juice
      (4) Antimicrobial therapy—single-dose treatment does not seem to be effective in pregnant women; however, a three-day course for initial infection has been proven to be as effective as a 7–10 day course; recurrent infections may require longer treatment regimens.
         (a) Cephalosporins—Cephalexin (Keflex) 500 mg PO QID for three to seven days
         (b) Ampicillin—500 mg PO TID or 875 mg PO BID for three to seven days
         (c) Amoxicillin-calvulanic acid (Augmentin)—500 mg PO TID or 875 mg PO BID for three to seven days
         (d) Nitrofurantoin (contraindicated in late third trimester and in women with G-6-PD)—100 mg PO BID for three to seven days

Medical Complications

- Urinary tract infection (UTI)
  1. Risk factors
     a. History of UTI
     b. Sickle cell trait
     c. Diabetes
     d. Pregnancy
        (1) The increased progesterone of pregnancy causes relaxation of the smooth muscles of the genitourinary (GU) tract
        (2) Decreased ureteral peristalsis and ureteral dilation present
        (3) Physical pressure on bladder
        (4) Urinary stasis
        (5) Incidence
           (a) Occurs in 2–7% of all pregnancies
           (b) Twenty-five percent to 30% progress on to pyelonephritis if left untreated
(e) Trimethoprim/sulfamethoxazole (Bactrim-DS) (contraindicated in third trimester or if have G-6-PD)—800/160 (1 double strength tablet) PO BID for three days
(f) Fosfomycin—3 g PO once
(5) Follow up two weeks later with a test of cure
(6) Screen for symptoms in subsequent prenatal visits and, if symptomatic, proceed with urinalysis; a urine culture should be obtained if dipstick is positive for leukocyte esterase and nitrates
(7) If recurrent infection, consider suppressive therapy for the remainder of the pregnancy
   (a) Nitrofurantoin 50–100 mg PO postcoitally or QHS
   (b) Cephalexin (Keflex) 250–500 mg PO postcoitally or QHS
(8) Patient education
b. Pyelonephritis
   (1) Hospitalization
   (2) IV antibiotics
   (3) IV hydration
   (4) Antipyretics
   (5) Pain control
   (6) Monitor for preterm labor

• Human immunodeficiency virus (HIV/AIDS)
  1. Etiology—DNA retroviruses termed human immunodeficiency viruses, HIV-1 and HIV-2; most cases worldwide are HIV-1; retroviruses have genomes that encode reverse transcriptase, allowing the virus to make DNA copies of itself in the host cells
  2. Incidence—44,073 new cases of HIV infection in the United States in 2014 (a 19% decrease from 2005 to 2014) (Centers for Disease Control and Prevention, 2016e)
  3. Transmission in women
     a. Heterosexual intercourse (87%)
     b. IV drug use (13%)
     c. Mother to infant
        (1) Fifteen percent to 25% if woman does not receive antiretroviral (ARV) therapy during pregnancy
        (2) Less than 1% if woman receives multi-agent ARV and if has undetectable viral load at delivery
  4. Diagnosis
     a. Risk assessment—drug use/sexual histories
     b. Universal screening of pregnant women for HIV as part of routine prenatal tests with option to decline (opt-out screening) recommended
     c. Repeat screening in third trimester if high risk, high incidence of HIV in reproductive-age women in geographic area, signs or symptoms of acute HIV infection
     d. Rapid HIV testing at labor and delivery if status unknown (Centers for Disease Control and Prevention, 2010b)
     e. HIV testing
        (1) Antibody testing
           (a) Screening tests—enzyme immunoassay (EIA) or rapid test
           (b) Confirmatory tests if screening test is positive—Western blot or immunofluorescence assay (IFA)

(2) Direct viral screens
     (a) Nucleic acid testing if suspect acute retroviral syndrome or recent infection
     (b) Confirm with subsequent antibody testing to document seroconversion

5. Signs and symptoms of initial HIV infection
   a. Incubation period from exposure to clinical disease—days to weeks
   b. Acute viral illness syndrome—lasts 10 days or less
   c. Fever
   d. Night sweats
   e. Fatigue
   f. Rash
   g. Headache
   h. Lymphadenopathy
   i. Pharyngitis
   j. Myalgias
   k. Arthralgias
   l. Nausea
   m. Vomiting
   n. Diarrhea
   o. Becomes asymptomatic and chronic viremia begins
   p. Time to immunodeficiency syndrome is 10 years

6. Signs and symptoms of AIDS
   a. Generalized lymphadenopathy
   b. Oral hairy leukoplakia
   c. Aphthous ulcers
   d. Thrombocytopenia
   e. Opportunistic infections
   f. Esophageal or pulmonary candidiasis
   g. Persistent herpes
   h. Cytomegalovirus
   i. Molluscum contagiosum
   j. Pneumocystis
   k. Toxoplasmosis
   l. Neurologic disease—50%
   m. CD4+ count of less than 200 is definitive diagnosis

7. Management of HIV-positive women
   a. Infection control
   b. Initial evaluation
   c. Complete review of systems (ROS)
   d. Physical examination
   e. Initial labs—HIV antibody, CD4+ count, viral load
   f. Follow-up by team of experts; interdisciplinary approach is most effective
   g. Prevention of vertical transmission
      (1) Viral load is strongest predictor for vertical transmission
      (2) Multi-agent ARV therapy during pregnancy—start after first trimester if mother does not need treatment
      (3) Intravenous zidovudine therapy during labor and delivery
      (4) Avoid artificial rupture of membranes if delivery is not imminent
      (5) Consider C-section at 38 weeks if viral load is greater than 1,000 copies/mL
      (6) Treat infant with ARV therapy—usual regimen is six weeks
• Toxoplasmosis (Gabbe et al., 2016)
  1. Incidence—40–50% of adults in the United States have the antibody to toxoplasmosis; about 5% seroconvert during pregnancy
    a. Congenital infection in 1 in 1,000 infants
    b. Severe congenital infection occurs in 1 in 8,000 pregnancies
  2. Most infections are asymptomatic; but of those infected
    a. Ten percent have damage resulting in lower IQ and deafness
    b. Infection can also cause abortion, prematurity, and IUGR
  3. Diagnosis
    a. Laboratory data
    b. Testing does not allow diagnosis between primary and secondary infection
    c. Testing for antitoxoplasma IgG antibody is difficult to interpret, so not a practical test to perform; universal screening of pregnant women for toxoplasmosis is not recommended in the United States unless woman is immunocompromised or infection is suspected
  4. Prevention
    a. Fully cook meat
    b. Do not drink unpasteurized milk or eat unpasteurized cheese
    c. Avoid kitty litter
    d. Good handwashing following gardening or wear gloves while gardening

• Rubella
  1. Incidence (Centers for Disease Control and Prevention, 2016)
    a. Rare in United States; in December 2011, expert panel declared that rubella elimination has been maintained in the United States
    b. Only six new cases of congenital rubella syndrome (CRS) between 2004 and 2012; five of these cases were likely contracted outside the United States, most likely in Asian or African countries
    c. Risk of long-term complications from CRS highest if mother infected in first trimester
    d. Most common complications are deafness, IUGR, cataracts, retinopathy, patent ductus arteriosus
  2. Pathophysiology
    a. Rubella is a single-stranded RNA virus
    b. Acquired respiratory disease
    c. Occurs two to three weeks following exposure
    d. Infectious virus is present in respiratory tract one week prior to symptom development
  3. Symptoms—rash
    a. Discrete pink-red maculopapular rash
    b. Appears first on face, then on trunk and extremities
    c. May also have lymphadenopathy, fever, arthralgias
    d. Symptoms last three days
    e. Up to 50% of all infections are subclinical
  4. Laboratory testing
    a. Demonstrate serologic conversion
    b. Recent rubella infection results in specific IgM in the fetal blood
    c. Can use CVS to recover virus
5. Treatment—prevention
   a. No available antiviral therapy
   b. Vaccination of susceptible reproductive-age women preconception or postpartum
   c. No documented cases of CRS from vaccine, but recommend giving at least four weeks prior to attempting a pregnancy or postpartum; may give while breastfeeding

   • Varicella-zoster (VZV) (Centers for Disease Control and Prevention, 2015)
   1. Herpes virus causing two common infections
      a. Varicella—chicken pox
         (1) Primary infection is rare in pregnancy
         (2) Greatest risk for congenital varicella syndrome is when mother is infected in first 20 weeks
         (3) Maternal infection occurring from six days before to two days after delivery can be passed to newborn, causing serious infection—5% mortality
         (4) Varicella infection causes varicella pneumonia in 10–30% of adults
      b. Herpes zoster—shingles
         (1) Secondary infection
         (2) Poses little risk to mother or baby
   2. Incidence
      a. Among pregnant women, 5/1,000
      b. VZV is highly contagious and peaks in winter and spring
   3. Pathophysiology
      a. Respiratory inhalation of virus particles
      b. Results in a viremia
      c. Incubation period is 10–21 days, usually 14–16 days after exposure
      d. Virus may be transmitted up to two days prior to rash
   4. Diagnosis
      a. Prior to rash, adults experience fever, malaise, myalgias, and headache
      b. Rash—maculopapular rash that becomes vesicles
      c. New vesicles continue for three to four days
      d. Crusted by one week
   5. Complications
      a. Pneumonia
      b. Increased risk of preterm labor and birth
      c. Maternal varicella onset between five days before and two days after delivery may result in neonatal infection; fatality rate can be as high as 30% (likely due to fetal exposure to virus without the benefit of receiving vertical transmission of maternal antibodies)
   6. Treatment
      a. Antiviral agent—IV acyclovir for severe infection in woman
      b. Infection in mother six days before delivery—give varicella-zoster immunoglobulin (VZIG), prepare for tocolysis to delay delivery; give VZIG to infant
      c. Infection in mother within three days postpartum—give infant VZIG
   7. Prevention
      a. Varicella vaccination for all susceptible reproductive-age women preconception (at least four weeks before attempting pregnancy) or postpartum
      b. VZIG as early as possible if pregnant woman exposed and susceptible

   • Tuberculosis (TB)
   1. Definition—infection, mostly in the lung, by Mycobacterium tuberculosis; clinical disease occurs in 10% of those infected
   2. Populations at risk for tuberculosis
      a. HIV-infected women
      b. Foreign-born women from countries with high TB prevalence
      c. Medically underserved low-income populations
      d. Close contact of persons with active infection
      e. Alcoholics and IV drug users
   3. Incidence (Centers for Disease Control and Prevention, 2016e)
      a. In 2014, 9,421 new cases in the United States; 2.96 cases per 100,000 persons
      b. In 2013, there were 555 deaths in the United States related to TB
   4. Screening tests for tuberculosis
      a. PPD intradermally
         (1) If negative (i.e., no induration) no further assessment is needed
         (2) Positive test interpreted by risk factors
            (a) 5 mm is positive for very high risk—HIV positive, with abnormal chest radiograph, recent contact with active case
            (b) 10 mm is positive for high risk (i.e., foreign born, HIV-negative IV drug user, low-income populations, associated medical problems)
            (c) 15 mm is positive for those with none of these risks
            (3) Vaccination with bacillus Calmette-Guérin (BCG) requires special guidance for interpretation
   5. Signs and symptoms
      a. Cough with minimal sputum production
      b. Low-grade fever
      c. Hemoptysis
      d. Weight loss
   6. Diagnosis
      a. Chest radiograph
      b. Sputum for acid fast bacillus
      c. Extrapulmonary disease occurs in any organ; disseminated disease exists in 40% of HIV-positive patients
   7. Treatment (Centers for Disease Control and Prevention, 2016e)
      a. Untreated tuberculosis poses a higher risk to the fetus than the risk for treatment
      b. Latent TB infection
         (1) Isoniazid (INH) daily or twice weekly using directly observed therapy for nine months
         (2) Supplementation with 10–25 mg/day of pyridoxine (vitamin B) recommended
         (3) 3HP INH and Rifapentine—not recommended for women planning to be pregnant in the next three months
Diagnosis of GDM can be made if two of the following

Fifteen percent at snack

Definition—endocrine disorder of abnormal carbohydrate metabolism resulting in inadequate production and/or utilization of insulin

Gestational diabetes

a. Diabetes occurs in 6–7% of pregnancies; 90% of these cases are gestational diabetes mellitus (GDM) (American College of Obstetricians and Gynecologists, 2013c)

b. Results from the diabetogenic effect of pregnancy

c. hPL (human placental lactogen) acts as an insulin antagonist

d. Estrogen and progesterone may also act as insulin antagonists

Diagnosis

a. Risk assessment at initial prenatal visit

b. High risk (U.S. Department of Health and Human Services [USDHHS], 2013)

(1) Overweight or obese
(2) Prior history of GDM
(3) Prior LGA infant weighing more than 9 lb
(4) > 25 years old
(5) Strong family history of type 2 diabetes
(6) African American, Hispanic, American Indian, Alaska Native, Native Hawaiian, or Pacific Islander
(7) Being treated for HIV

c. Low risk (Centers for Disease Control and Prevention, n.d.)

(1) < 25 years old
(2) Normal weight before pregnancy
(3) Member of ethnic group with low prevalence of diabetes
(4) No known diabetes in first-degree relatives
(5) No history of abnormal glucose tolerance
(6) No history of poor obstetric outcome

Screening (American Diabetes Association, 2012; American College of Obstetricians and Gynecologists, 2013c)

a. High risk—screen as soon as possible using standard diagnostic testing

b. All women not considered low risk—screen at 24–28 weeks

Two-step approach

(a) Screen with a 1-hour 50-g glucose challenge test (GCT)
(b) If 130 mg/dL (90% sensitivity) or more, or greater than 140 mg/dL (80% sensitivity), perform diagnostic

100-g three-hour diagnostic oral glucose tolerance test (OGTT) on another day after an overnight eight-hour fast

c. Diagnosis of GDM can be made if two of the following results from the three-hour testing are abnormal utilizing either the Carpenter and Coustan or the National Diabetes Data Group criteria

(2) One-step approach

(a) Perform a 75-g two-hour OGTT after an overnight eight-hour fast
(b) Measure fasting plasma glucose and at one and two hours post-OGTT
(c) Diagnostic criteria for one-step approach for GDM—presence of any abnormal number of the following plasma glucose values

i. Fasting 95 mg/dL or greater
ii. One hour 180 mg/dL or greater
iii. Two hours 155 mg/dL or greater
iv. Three hours 140 mg/dL or greater

5. Presence of three or more of the following risk factors increases the chance of perinatal mortality

a. Uncontrolled hyperglycemia
b. Ketonuria, nausea, vomiting
c. GHTN, edema, proteinuria
d. Pyelonephritis
e. Lack of compliance with care
f. Maternal age older than 35 years

6. Management—objective is to maintain strict levels of maternal glucose for optimum perinatal outcomes

a. Co-manage or transfer to perinatal center
b. Diet

(1) 30 kcal/kg of actual or ideal body weight
(2) Twenty-five percent at breakfast
(3) Thirty percent at lunch
(4) Thirty percent at dinner
(5) Fifteen percent at snack

c. Distribution of calories

(1) Protein 20% of calories
(2) Fat 30–35% of calories
(3) Carbohydrates 45–50% of calories
d. Medications

(1) Oral hypoglycemics—glyburide and acarbose are pregnancy Category B; others are Category C
(2) Insulin

e. Maternal monitoring

(1) GHTN
(2) Changing insulin requirements
(3) Decreased need in first trimester because of low hPL levels
(4) Increases in second trimester because of increasing hPL levels
(5) HgbA1C/fasting plasma
f. Fetal monitoring

(1) Increased risk of neural tube defects and cardiac anomalies in nongestational diabetics
(2) Ultrasound for IUGR, macrosomia, polyhydramnios
(3) FMCs beginning at 28 weeks
(4) NSIs with AFI or CST beginning at 36 weeks
(5) May consider amniocentesis for L/S ratio (maturity is 3:1 with positive PG)
g. Immediate postpartum—monitor insulin requirements (usually decrease 24–48 hours after delivery of the placenta)
h. 75-g two-hour OGTT at 6–12 weeks postpartum—screen for diabetes and then follow with subsequent screening for diabetes or prediabetes

- Thyroid disease
  1. Definition—most common thyroid diseases in pregnancy are nontoxic goiter, hyperthyroidism, hypothyroidism, and thyroiditis
  2. Impact of pregnancy on maternal thyroid physiology is great; structural and functional changes related to pregnancy can cause confusion in defining abnormalities
  3. Thyroid enlarges somewhat because of hyperplasia and increased vascularity but does not cause serious thyromegaly
  4. Thyroid hormones in pregnancy—total serum thyroxine (TT₄) and triiodothyronine (TT₃) concentrations increase; TSH and free thyroxine (FT₄) levels are not affected
  5. Thyrotoxicosis or hyperthyroidism
    a. Incidence—1/2,000 pregnancies
    b. Signs and symptoms
      (1) Tachycardia, more than normal in pregnancy
      (2) Elevated sleeping pulse rate
      (3) Thyromegaly
      (4) Exophthalmos
      (5) Failure to gain weight with normal or increased food consumption
    c. Diagnosis
      (1) Elevated serum-FT₄ or free thyroxine index (FTI) levels
      (2) Suppressed TSH levels
    d. Treatment
      (1) Control with thioamide drugs; propylthiouracil or methimazole
      (2) Thyroidectomy if medical approach unsuccessful but easier done outside pregnancy because of increased vascularity
    e. Maternal and fetal outcomes
      (1) Good if treatment successful
      (2) If not, higher incidence of preeclampsia and heart failure as well as preterm birth, IUGR, and stillbirth
  
- Blood incompatibilities—D(Rh) isoimmunization
  1. Incidence (Rh2)
    a. Highest incidence found in Basques of France and Spain (25–40%)
    b. White Americans approximately 15%
    c. African Americans approximately 5–8%
    d. American Hispanics approximately 5–10%
  2. Types
    a. ABO incompatibility
      (1) Twenty percent to 25% of pregnancies are ABO incompatible
      (2) Isoimmunization causes 60% of fetal hemolytic disease
    b. Maternal serum contains anti-A or anti-B
      (1) Rarely causes more than fetal anemia with mild to moderate hyperbilirubinemia in the first 24 hours of life
      (2) Caused by IgM anti-B or IgM anti-A crossing the placenta poorly
    c. Sensitization caused by minor antigens
      (1) Some cause hemolytic disease, some do not
      (2) Believed to be the result of incompatible transfusion, although may be seen in multiparas
    d. Kell—may have mild to severe with hydrops (K-kills)
    e. Duffy—Fy⁺ may have mild to severe with hydrops; Fy⁻—not associated with problems
  3. Pathogenesis for Rh isoimmunization
    a. Three requirements
      (1) Fetus must be D⁺ and mother D⁻
      (2) Mother must be able to be sensitized
      (3) Fetal cells must gain access into the mother's bloodstream in sufficient quantities
    b. Occurs when
      (1) There is a transfusion of incompatible blood to the mother, usually before pregnancy
      (2) A fetomaternal exchange of blood during
        (a) Delivery
        (b) Spontaneous or induced abortion (woman may not realize she is pregnant)
        (c) Amniocentesis
        (d) Ectopic
        (e) Placental separation
        (f) Unknown cause
  4. Implications
    a. Maternal
      (1) No significant maternal complications
      (2) Fetal loss
    b. Fetal
      (1) Mother produces anti-D antibodies (IgG), which cross the placenta
      (2) Hemolysis of fetal red blood cells (RBCs) then occurs
      (3) Fetal anemia results with hematopoiesis in liver and spleen
      (4) Fetal liver and spleen enlarge
      (5) Liver and spleen show degenerative changes
      (6) Erythroblastosis fetalis results (ascites, cardiac failure, hydrothorax)
      (7) Hydrops fetalis with generalized edema
    c. Newborn
      (1) Maternal IgG is still present and attacking RBCs
      (2) Further RBC breakdown occurs
      (3) Fetal liver is immature and unable to clear RBCs
      (4) Hyperbilirubinemia results
      (5) Bilirubin causes kernicterus with CNS damage and possible death
  5. Management
    a. Unsensitized pregnancy—mother Rh negative with negative antibody titer
      (1) ABO/D group and antibody titer at first visit
      (2) Repeat antibody screen at 28 weeks and give RhoGAM if remains unsensitized
(3) RhoGAM is protective for 12 weeks
(4) If infant is Rh positive, give mother RhoGAM again after delivery
b. Sensitized pregnancy—mother Rh negative with positive antibody titer (> 1:4)
(1) Consult—co-manage or transfer care
(2) Follow fetus with serial ultrasounds to assess for signs of ascites
(3) Follow titers to assess need for amniocentesis
• Acquired anemias
1. Iron-deficiency anemia
   a. Definition—hemoglobin less than 11.0 g/dL first trimester, 10.5 g/dL second trimester, 11.0 mg/dL third trimester and postpartum
   b. Etiology—related to poor nutrition resulting in inadequate iron stores; consequence of expansion of blood volume with inadequate expansion of maternal hemoglobin mass
c. Signs and symptoms—not apparent unless severely anemic
d. Differential diagnosis
   (1) Anemia associated with chronic disease
   (2) Blood loss effect
e. Diagnostic tests
   (1) Serum ferritin levels lower than normal
   (2) Microcytic, hypochromic erythrocytes
   (3) Serum iron-binding capacity elevated (but not a significant finding because it is elevated in pregnancy in absence of iron deficiency)
f. Associated with LBW, premature delivery, perinatal mortality
g. Management and treatment—correct the hemoglobin mass deficit and rebuild iron stores
   (1) Iron replacement therapy
   (2) Ferrous sulfate, ferrous gluconate, ferrous fumarate
   (3) Include vitamin C and folic acid
   (4) Intramuscular therapy if patient is unable to take orally or if severely anemic
   (5) Iron therapy for three months after anemia corrected
2. Anemia from acute blood loss
   a. Definition—drop in hemoglobin due to moderate to severe blood loss, which can occur at any time in pregnancy
   b. Etiology—abortion, ectopic pregnancy, hydatidiform mole, placenta previa, abruptio placenta, placenta implantation anomalies, and so on
c. Management and treatment
   (1) Massive hemorrhage requires restoration of volume and cells to maintain perfusion of vital organs
   (2) Treat residual iron depletion (Hb 7 g/dL or greater) with oral iron for three months as long as woman is afebrile and able to ambulate
3. Megaloblastic anemia
   a. Definition—group of hematologic disorders characterized by blood and bone marrow abnormalities caused by impaired DNA synthesis
   b. Prevalence—rare in the United States
c. Etiology—in the United States, during pregnancy, most always results from folic acid deficiency due to lack of consumption of green leafy vegetables, legumes, and animal protein
d. Signs and symptoms—nausea, vomiting, and anorexia that worsen as deficiency increases
e. Diagnosis—laboratory tests showing hypersegmentation of neutrophils, macrocytic erythrocytes, bone marrow megaloblastic erythropoiesis
f. Risks to fetus—neural tube defects
 g. Prevention—folic acid (0.4 mg daily for women of childbearing age; 4 mg daily prior to and during pregnancy for women with history of previous neural tube defect infant), nutritious diet, and iron
• Inherited anemias—hemoglobinopathies
1. Sickle cell hemoglobinopathies
   a. Sickle cell anemia (SS disease)
   b. Sickle cell–hemoglobin C disease (SC disease)
   c. Sickle cell–b-thalassemia disease (S–b-thalassemia disease)
2. Etiology—individual inherits a gene for S hemoglobin from each parent, or an S and a C gene from each, or an S and b-thalassemia gene from each
3. Incidence
   a. SS disease—1 in 12 African Americans has sickle cell trait—SA hemoglobin; incidence is 1 in 576 theoretically but is, in fact, less common
   b. SC disease—1 in 40 African Americans has hemoglobin C gene; incidence of SC disease in African American pregnant women is 1 in 2,000
   c. Sickle cell–b-thalassemia disease—1 in 2,000 African American women
4. Signs and symptoms—SS is worst of hemoglobinopathies in pregnancy
   a. Sickle cell crisis occurs more frequently in pregnancy
   b. Infections and pulmonary complications more common
   c. Contributes to maternal mortality
5. Differential diagnosis
   a. Thalassemia
   b. G-6-PD deficiency
6. Physical findings
   a. Hb 7 g/dL or less
   b. Intense pain of crisis particularly in third trimester, in labor, and in puerperium
   c. Fever due to dehydration or infection
   d. Acute chest syndrome—pleuritic pain, cough, fever, lung infiltrate, and hypoxia
7. Management and treatment
   a. Consult and co-manage
   b. Weekly fetal surveillance after 32–34 weeks
   c. Pain medication
   d. Follow-up, including possible need for paternal blood screening and genetic counseling
   e. Counseling for current and future pregnancies
Medical Complications

- Appendicitis
  1. Incidence—suspected in 1/1,000; found in 1/1,500 pregnant woman; most common reason for surgical exploration during pregnancy
  2. Pregnancy confounds signs and symptoms of appendicitis
     a. Nausea, vomiting, and anorexia of pregnancy versus appendicitis
     b. Displacement of the appendix by the growing uterus moves the point of pain and tenderness associated with appendicitis
     c. Leukocytosis occurs, to some extent, in pregnancy
     d. Confounding diagnoses, especially in pregnancy; pyelonephritis, renal colic, placental abruption, and degeneration of a myoma
     e. In late pregnancy, symptoms may be very atypical
  3. Diagnosis and management
     a. Persistent abdominal pain and tenderness are most critical symptoms
     b. Immediate surgical exploration indicated if suspected
     c. Diagnosis correct in 50–65% of cases; verify to prevent peritonitis
- Neoplastic disease
  1. Incidence of cancer in pregnancy—uncommon; second leading cause of death in women ages 15–44 in the United States
  2. Most frequent types of cancers in pregnancy—genital tract, breast, and malignant melanoma
  3. Principle of treatment—the woman should not be penalized for being pregnant
  4. Approach to the pregnant woman with cancer
     a. Surgical intervention for diagnosis, staging, or therapeutic purposes is well tolerated; oophorectomy may be done after eight weeks of gestation because placental hormone production is sufficient
     b. Radiation of 15–20 rads may cause microcephaly and mental retardation in the fetus
     c. Chemotherapy risk for the fetus depends on GA, but avoid at 5–10 weeks if possible
  5. Breast cancer
     a. Incidence—most common malignancy at all ages; estimated at 10–30/100,000 pregnancies
     b. Effects of pregnancy on breast cancer—none of note; stage of the disease at time of diagnosis and treatment more important to survival
     c. Diagnosis—same as for nonpregnant women; any suspicious breast mass should be diagnosed immediately using one or more of the following methods
        (1) Needle aspiration can differentiate a cyst or galactocele from solid tumor
        (2) Tissue biopsy if needle biopsy results are not diagnostic
        (3) Mammography—but more difficult because of denser tissue; requires adequate shielding; radiation is less than 100 mrad
        (4) Once cancer diagnosis made, limited metastatic search and chest radiogram done; computed tomography (CT) bone and liver scans are contraindicated because of ionizing radiation
     d. Treatment
        (1) Surgery as soon as the diagnosis is confirmed
        (2) Radiotherapy not recommended
        (3) Chemotherapy can be given in pregnancy
     e. Recommendations for future pregnancies—little evidence exists to say that survival is adversely affected by pregnancy after mastectomy for breast cancer
  6. Malignant melanoma
     a. Incidence—estimated at 0.14 to 2.8 per 1,000 live births
     b. Skin changes to watch and report—pigmented lesion that changes
        (1) Contour
        (2) Surface elevation
        (3) Discoloration
        (4) Itching
        (5) Bleeding
        (6) Ulceration
     c. Clinical stages
        (1) Stage I—no positive lymph nodes (85%); tumor thickness is single most important factor in predicting survival at this stage
        (2) Stage II—nodes are positive
        (3) Stage III—distant metastases
     d. Effect of pregnancy—usually have thicker tumors when diagnosed in pregnancy
     e. Treatment—surgery and chemotherapy if indicated
  7. Cervical cancer
     a. Incidence—most common form of cancer in pregnancy; carcinoma in situ 1.3/1,000; invasive carcinoma ½,200 pregnancies
     b. Abnormal Pap tests equal 3% during pregnancy
     c. Colposcopy to confirm and identify lesions
     d. Treatment—varies with stage of cancer and duration of pregnancy
        (1) Microinvasive disease follows same guidelines as for nonpregnant intraepithelial disease; continuation of pregnancy and vaginal delivery with postpartum therapy
        (2) Invasive cancer is treated immediately in first half of pregnancy; if detected in latter half, can wait for fetal viability and maturation
- Heart disease
  1. Incidence—rheumatic heart disease almost nonexistent in United States because of better management and resources; congenital heart disease accounts for half of pregnancy heart problems
  2. Heart disease accounts for 5–15% of maternal deaths
  3. Etiology—cardiac output increases in pregnancy by 30–50%, half of which occurs by the eighth week; reaches maximum level by midpregnancy
  4. Symptoms
     a. Progressive dyspnea
     b. Nocturnal cough
     c. Hemothysis
     d. Syncope
     e. Chest pain
5. Clinical findings
   a. Cyanosis
   b. Clubbing of fingers
   c. Neck vein distension
   d. Systolic murmur grade 3/6 or greater
   e. Diastolic murmur
   f. Cardiomegaly
   g. Persistent arrhythmia
   h. Persistent split-second sound

6. Diagnosis—normal changes of pregnancy make diagnosis difficult
   a. EKG
   b. Echocardiography
   c. Chest radiograph

7. Functional classification of cardiac disease—based on past and present disability, uninfluenced by physical signs
   a. Class I—uncompromised; no limit on activity; no symptoms of cardiac insufficiency, no anginal pain
   b. Class II—slightly compromised; ordinary activity results in excessive fatigue, palpitation, dyspnea, or anginal pain
   c. Class III—markedly compromised; marked limitation of activity; less than normal activity causes symptoms manifested in Class II
   d. Class IV—severely compromised; symptoms manifested in Class II and Class III develop at rest and become more intense with activity

8. Antepartum management of the patient with Class I and Class II cardiac disease with regard to the following
   a. Preventative measures—avoid upper respiratory infection (URI) contact; provide pneumococcal and flu vaccines
   b. No smoking
   c. No illicit drugs, especially cocaine and amphetamines
   d. Instruct client regarding signs and symptoms of developing congestive heart failure:
      1. Nocturnal cough
      2. Basilar rales

Questions
Select the best answer.

1. A female patient comes to the office indicating her menstrual period is one month overdue. Her level of pregnancy diagnosis is:
   a. positive.
   b. presumptive.
   c. possible.
   d. probable.

2. A female patient states that she is trying to get pregnant and had unprotected intercourse on day 14 of her usual 28-day menstrual cycle. However, the pregnancy test was negative three days later. Appropriate management would be to:
   a. order an ultrasound.
   b. prescribe progesterone.
   c. repeat the test in a week.
   d. order a serum pregnancy test.

3. Pregnancy tests detect:
   a. estrogen.
   b. human chorionic gonadotropin.
   c. human placental lactogen.
   d. progesterone.

4. During the first few weeks of pregnancy, progesterone is secreted by the:
   a. placenta.
   b. corpus luteum.
   c. endometrium.
   d. trophoblasts.

5. Blood in the chorionic villi pertains to the circulation of the:
   a. mother.
   b. mother and fetus.
   c. placenta.
   d. fetus.

6. The vessels of the umbilical cord are:
   a. one vein with oxygenated blood and two arteries with deoxygenated blood.
   b. one vein with deoxygenated blood and two arteries with oxygenated blood.
   c. two veins with oxygenated blood and one artery with deoxygenated blood.
   d. two veins with deoxygenated blood and one artery with oxygenated blood.

7. The uterus is palpable at the symphysis pubis at:
   a. 6 weeks.
   b. 8 weeks.
   c. 12 weeks.
   d. 16 weeks.

8. Implantation occurs ________ after fertilization.
   a. 24–48 hours
   b. 3–4 days
   c. 6–7 days
   d. 9–10 days

9. Placental transport of oxygen and glucose occurs by:
   a. simple perfusion.
   b. facilitated diffusion.
   c. active osmosis.
   d. active perfusion.

10. The human zygote consists of:
    a. 46 chromosomes from each parent.
    b. 2 pairs of sex chromosomes.
    c. 23 chromosomes.
    d. 23 pairs of chromosomes.

11. The trophoblast will ultimately become the:
    a. placenta.
    b. embryo.
    c. blastocyst.
    d. umbilical cord.

12. At the initial visit of a primigravida patient, you heard a Grade I systolic murmur. Your next step in management would be:
    a. a cardiology consult.
    b. chest radiograph.
    c. immediate referral.
    d. no intervention.
13. The drop in diastolic blood pressure during normal pregnancy is partly the result of:
   a. plasma volume expansion.
   b. progesterone's effect on vessel walls.
   c. increased cardiac output.
   d. pooling of plasma in tissues.

14. Changes in the respiratory system due to pregnancy may cause:
   a. tachypnea.
   b. cough.
   c. increased chest diameter.
   d. pale nasal mucosa.

15. A primigravida came in for a visit at 34 weeks stating that she has "a lot of vaginal discharge" but no other symptoms or problems. On exam, you see a white, odorless discharge of moderate quantity. Your next step would be to:
   a. treat for candida.
   b. evaluate for trichomoniasis.
   c. reassure her that this is normal.
   d. send a vaginal culture.

16. A patient comes for a 24-week visit and mentions that her interest in sex has increased greatly. You respond to her concern because you know that increased libido is:
   a. a normal variation of response in pregnancy.
   b. an abnormal response of changing image.
   c. reflective of repressed desire to disrupt the pregnancy.
   d. the early sign of a parenting disorder.

17. At the 36-week visit, a patient tells you that she is having nightmares that include labor as well as fears of having an abnormal baby. Your best response is to:
   a. tell her there is nothing to worry about because most babies are fine.
   b. encourage her to tell you more about the nightmares and her fears.
   c. make an appointment for her with a mental health nurse practitioner.
   d. reassure her that there are dangers about which we all have to worry.

18. Initial management of constipation in pregnancy should include suggestions for:
   a. increased protein intake.
   b. limitation of calcium-rich foods.
   c. use of a laxative.
   d. increased intake of fiber and fluids.

19. A female patient has experienced three spontaneous abortions and is now pregnant for the fourth time. The term that defines her obstetrical status is:
   a. multipara.
   b. nullipara.
   c. primigravida.
   d. primipara.

20. The calculation of estimated date of birth (EDB) by Naegle's rule is based on a(n):
   a. 28-day menstrual cycle.
   b. average length of pregnancy of 290 days.
   c. 32-day cycle.
   d. length of pregnancy of 270 days.

21. Pregnant for the third time, the patient's obstetric history indicates that she has experienced two miscarriages at 16 and 18 weeks, respectively, and one twin birth at 36 weeks. One twin died, but the other is alive and well. The four-digit descriptor of this history is:
   a. 0121.
   b. 0221.
   d. 2201.

22. A patient comes in for her first antepartal visit. When asked the date of her last menstrual period, she indicates she has not had one since she has been nursing her six-month-old daughter. You diagnose that she is pregnant. How would you determine estimated date of birth (EDB)?
   a. Determine when she expected to get her period and calculate from there.
   b. Document quickening and extrapolate from there.
   c. Send her to the fetal assessment unit for an ultrasound.
   d. Get good sexual history and use last coitus as the basis for calculation.

23. A female patient (G1 P0) comes for her 20-week visit. Her abdominal exam shows the uterine fundus to be halfway between the symphysis and the umbilicus. This finding leads you to consider:
   a. intrauterine growth restriction (IUGR).
   b. nothing because it is normal.
   c. oligohydramnios.
   d. that she is not eating and gaining enough weight.

24. In an abdominal exam using Leopold's maneuvers, the first step is to determine fetal:
   a. attitude.
   b. position.
   c. engagement.
   d. lie.

25. A patient presents for her first antepartal visit. She is 10 weeks pregnant and requests to listen for the FHT. You have a handheld Doppler available. Your response would be which of the following?
   a. "No, there is no reason to listen because it cannot be heard until 18 weeks."
   b. "We can try to listen today. But we may not hear the heartbeat yet."
   c. "We can surely listen! Because we can definitely hear the heartbeat as early as 6.5 weeks."
   d. "We do not usually do that at any visit."

26. Normal findings on speculum and pelvic examination of a pregnant woman include:
   a. bluish color of the cervix.
   b. pale vaginal mucosa.
   c. an open cervical os.
   d. a firm, slightly enlarged cervix.

27. Clinical pelvimetry of a woman with an adequate pelvis would provide which of the following findings?
   a. Ischial tuberosities of 10 cm and a flat sacrum
   b. Convergent sidewalls
   c. Pubic arch of 90 degrees with diagonal conjugate of longer than 11.5 cm
   d. Protuberant ischial spines

28. The value of clinical pelvimetry rests in its ability to:
   a. predict successful vaginal birth.
   b. identify the characteristics of the woman's pelvis.
   c. determine whether the woman will have a breech presentation.
   d. predict an occiput posterior position.
29. A primigravida at 13.5 weeks states that she is concerned because she has not felt the baby move yet. Your response should be which of the following?
   a. “Most women with their first pregnancy do not feel movement until around 20 weeks.”
   b. “You are worrying too much, just relax.”
   c. “I will order an ultrasound just to be sure everything is fine.”
   d. “I would like you to return in a week so we can recheck it.”

30. Maternal serum alphafetoprotein screening is performed in what time frame?
   a. 8–12 weeks
   b. 12–15 weeks
   c. 15–19 weeks
   d. 20–24 weeks

31. The CDC recommends screening for group B streptococcus (GBS) at what point?
   a. At the first visit
   b. When labor starts
   c. At 20 weeks
   d. At 35–37 weeks

32. The triple screen tests for:
   a. AFP, progesterone, hCG.
   b. AFP, estriol, hCG.
   c. Estriol, progesterone, hPL.
   d. Estradiol, progesterone, AFP.

33. A nonstress test containing two fetal heart accelerations lasting 15 seconds that are 15 beats per minute above the baseline is:
   a. negative.
   b. positive.
   c. nonreactive.
   d. reactive.

34. The recommended folic acid supplement for a woman with a past history of a baby with a neural tube defect is:
   a. 4 mg per day starting before conception.
   b. 0.4 mg per day starting with a missed period.
   c. 2 mg per day prior to conception.
   d. 0.4 mg per day throughout pregnancy.

35. A female patient comes in for her first antepartal visit. She is 5 ft 4 in and weighs 190 lb (BMI 33). Weight goal for the pregnancy should be to:
   a. maintain current weight.
   b. gain 11–20 lb.
   c. gain 25–35 lb.
   d. lose 10–15 lb.

36. Exercise guidelines for healthy pregnant women include suggestions to:
   a. discontinue exercise at 20 weeks.
   b. begin intense program of exercise, especially if prepregnant weight was high.
   c. modify the existing program if symptoms occur.
   d. limit fluids before exercising.

37. Anticipatory guidance concerning sexual activity during pregnancy includes which of the following?
   a. Sexual intercourse may continue until early third trimester in an uncomplicated pregnancy.
   b. Sexual intercourse is contraindicated throughout pregnancy if there is a past history of preterm labor.
   c. The pregnant woman's sexual desire may change throughout pregnancy.
   d. Most pregnant women do not desire sex after the first trimester.

38. Breastfeeding should be encouraged for:
   a. all women whose families strongly support the idea.
   b. all pregnant women who are not HIV positive.
   c. women with adequate breast tissue.
   d. women who desire to do so.

39. A patient comes in for her first antepartal visit at eight weeks and tells you she has nausea every morning but is able to eat and drink in the afternoon. Your first step in management at this point would include:
   a. a prescription for antinausea medicine.
   b. vitamin B₆ 50 mg bid.
   c. advising her to eat small, frequent meals.
   d. advising her to drink a carbonated beverage on rising.

40. The fatigue of early pregnancy is best managed by:
   a. ruling out a thyroid problem.
   b. encouraging increased exercise.
   c. encouraging increased amounts of caffeinated drinks.
   d. reassurance and rest.

41. Leg cramps may be relieved by:
   a. pointing the toes.
   b. hot compresses.
   c. flexion of the foot.
   d. hot tub baths.

42. A patient comes for her 36-week visit, during which she mentions that her hands and feet are somewhat swollen. She has gained 2 lb since her visit 2 weeks ago; her BP is 128/76 mm Hg and she has no protein in her urine. What is your plan?
   a. Refer to perinatologist for impending preeclampsia.
   b. Explain that the edema at this stage is normal and see her in a week.
   c. Order bed rest with a return visit in a week.
   d. Restrict salt and fluid intake.

43. A primigravida patient asks about the value of childbirth preparation classes during a second-trimester visit. You tell her that the evidence indicates that they are associated with:
   a. reduced use of analgesics/anesthesia during labor.
   b. improved parenting skills.
   c. decreased cesarean rates.
   d. less use of IVs in labor.

44. Diabetes screening recommendations during pregnancy for the woman who is obese include:
   a. fasting blood glucose each trimester.
   b. testing hemoglobin A₁c in the first trimester.
   c. routine screening early in pregnancy and at 24–28 weeks.
   d. the same as for the normal weight woman.

45. A patient comes for her 34-week visit, at which time the fundus measures 39 cm. Abdominal palpation reveals a large uterus and difficulty feeling fetal parts. The most likely diagnosis is:
   a. multiple gestation.
   b. macrosomic fetus.
   c. uterine fibroid.
   d. polyhydramnios.

46. During the initial prenatal visit, the patient mentions that she had a rubella immunization three weeks before conceiving this baby. Your plan is to:
   a. advise her to consider termination of the pregnancy.
   b. continue regular care.
   c. consult with an infectious disease specialist.
   d. refer to a perinatologist.
47. On physical examination at an initial prenatal visit of a 25-year-old woman who is at 14 weeks' gestation, you feel a 1-cm mobile, well-defined, nontender mass in the upper, outer quadrant of her right breast. Your plan is to:
   a. explain that this is normal with the hormonal changes of pregnancy.
   b. advise her that you will watch at each visit to assess for any change.
   c. schedule a mammogram to be done in the third trimester.
   d. refer for further evaluation with biopsy.

48. A pregnant woman who is 5 ft 3 in tall has a prepregnancy weight of 115 lb. Which of the following represents the most appropriate weight for her by the end of her pregnancy?
   a. 120 lb
   b. 125 lb
   c. 145 lb
   d. 165 lb

49. The biophysical profile (BPP) assesses fetal well-being with:
   a. a combination of nonstress test and ultrasound evaluation to assess five variables.
   b. both a contraction stress test and ultrasound evaluation of amniotic fluid volume.
   c. serial ultrasounds to evaluate amniotic fluid volume as well as fetal breathing and body movement and tone.
   d. evaluation of fetal movement with kick counts after administration of oxytocin or nipple stimulation.

50. Which of the following is an appropriate plan of care for a woman at 40 weeks' gestation with a BPP score of 8 that includes a 2 score for amniotic fluid volume?
   a. Order a contraction stress test.
   b. Repeat the BPP in 48 hours.
   c. Schedule a return visit after one week.
   d. Admit for induction of labor and delivery.

51. Blood glucose monitoring for a woman with gestational diabetes should be done:
   a. once a week, at the same time each week.
   b. two times daily: one hour after the smallest and largest meal of the day.
   c. four times daily: fasting and one or two hours after each meal.
   d. three times daily: one hour before each meal.

52. A patient who is 11 weeks pregnant calls you from the ER to say that she sustained a laceration and they want to give her a tetanus booster. You would tell her that:
   a. all vaccinations are contraindicated in pregnancy.
   b. it is not a problem because she does not need the tetanus booster.
   c. the tetanus booster can be given in pregnancy if needed.
   d. she should wait until the third trimester.

53. Drugs from which one of the following categories may be given to a pregnant woman when the potential benefit justifies the potential fetal risk?
   a. Category A
   b. Category B
   c. Category C
   d. Category X

54. A woman who is pregnant for the second time and whose first pregnancy ended with a spontaneous abortion at 10 weeks is a:
   a. multigravida.
   b. multipara.
   c. primigravida.
   d. primipara.

55. A pregnant woman presents for her 24-week visit, at which time she relates that she does not feel very interested in sex anymore. Your response is to:
   a. tell her this is common and she should not be concerned.
   b. assure her the interest will return in the third trimester.
   c. tell her to get more rest and her interest will increase.
   d. get her to talk about what she is feeling and thinking about sex.

56. The screening test for group B streptococcus requires that the specimen be obtained from the:
   a. ectocervix and vaginal sidewalls.
   b. ectocervix and endocervical os.
   c. endocervical os and rectum.
   d. vaginal introitus and rectum.

57. Pregnancy loss and the woman's need for appropriate grieving occur across the reproductive spectrum. Maladaptive grief reactions are best addressed by:
   a. telling the woman to put the baby's things away.
   b. listening to whatever the woman has to say.
   c. encouraging the woman to be strong so she will get past it.
   d. making the woman an appointment with a therapist.

58. Recommended routine screening tests at an initial antenatal visit during the first trimester include:
   a. group B streptococcus culture.
   b. syphilis serology.
   c. triple marker screen.
   d. ultrasound.

59. Which of the following statements concerning influenza vaccination for pregnant women is true?
   a. Vaccination is recommended for all women who will be pregnant during the influenza season.
   b. Pregnant women with HIV infection should not receive this vaccination.
   c. The pregnant woman should be offered the option of either the injection or nasal administration of the vaccine.
   d. Vaccination should be given only in the second or third trimester.

60. RDA of calories and protein during pregnancy is:
   a. 3,000 kcal and 50 g/day.
   b. 3,500 kcal and 60 g/day.
   c. 3,800 kcal and 60 g/day.
   d. 2,500 kcal and 60 g/day.

61. A patient presents for her 36-week visit. Abdominal exam reveals a likelihood of polyhydramnios. In response to her question of where does the fluid come from, you answer that it comes from:
   a. the mother's blood volume.
   b. a combination of maternal serum and fetal urination.
   c. amniotic epithelium and fetal functions.
   d. fluid ingested by the mother.

62. A 24-year-old primigravida presents for her initial visit and asks how the fetus has genes from both her husband and herself. Your response is based on which of the following?
   a. Mitosis occurs, producing half the number of chromosomes.
   b. Meiosis occurs, producing half the number of chromosomes.
   c. The egg is a somatic cell.
   d. Sperm is a somatic cell.

63. Which of the following are parts of the placenta?
   a. Trophoblasts, chorion, amnion
   b. Trophoblasts, chorion, endometrium
   c. Chorion, amnion, umbilical cord
   d. Intervillous spaces, endometrium, trophoblasts
64. The term *conceptus* means which of the following?
   a. The embryo and placenta
   b. The embryo and membranes
   c. The embryo, membranes, and placenta
   d. The embryo, membranes, placenta, and endometrium

65. Which structure in human reproduction produces the most diverse and greatest quantity of steroid and protein hormones?
   a. Trophoblast
   b. Blastocyst
   c. Chorion laeve
   d. Decidua basalis

66. At her 32-week visit, a patient asks you to tell her what you are looking for or feeling when doing her abdominal exam with Leopold’s maneuvers. You respond that you are:
   a. determining the placement of the placenta.
   b. finding which direction the fetus is lying.
   c. evaluating the size of the uterus.
   d. evaluating adequacy of fetal growth.

67. Appropriate routine screening tests at an 18-week visit include:
   a. gestational diabetes testing.
   b. chlamydia and gonorrhea tests.
   c. CBC or hematocrit.
   d. multiple marker screen.

68. A patient at 37 weeks calls to say she feels like the fetus is moving less. After further inquiry you decide to send her for an NST. When she asks what this is, you explain that it is an assessment of fetal well-being based on:
   a. evaluation of body movements.
   b. breathing movements.
   c. fetal heart rate response to fetal movement.
   d. fetal body tone.

69. A patient comes for a first visit at 11 weeks' gestation. Her history reveals her concern about sore gums that sometimes bleed. You think that:
   a. she most likely needs to see a periodontist.
   b. gingivitis is common in pregnancy with increased vascularity of connective tissue.
   c. she should be started on antibiotics to prevent systemic infection.
   d. she should be placed on a soft diet until the problem is resolved.

70. A female patient presents at 32 weeks' gestation with vaginal bleeding for the past six hours, back pain, and irregular abdominal cramping pain. Exam reveals diffuse abdominal tenderness and increased uterine tone. You suspect:
   a. marginal placenta previa.
   b. placental abruption.
   c. preterm labor.
   d. pyelonephritis.

71. A post-term pregnancy is best diagnosed by:
   a. certain LMP
   b. third-trimester ultrasound.
   c. fundal growth.
   d. quickening.

72. Serial beta hCG levels are done after uterine evacuation for hydatidiform mole to:
   a. ensure that the woman is not pregnant in the first year after treatment.
   b. monitor for persistent trophoblastic proliferation.
   c. identify a pregnancy early so appropriate care can be provided.
   d. assess for a possible undetected ectopic pregnancy.

73. A patient indicates that she is afraid of Pitocin because her sister had a uterine rupture when she was induced. Your response would be to:
   a. reassure her because she will not need induction anyway.
   b. discuss how Pitocin is given with assurance that nothing will go wrong.
   c. discuss alternate methods to promote uterine readiness and contractions.
   d. say that Pitocin is the best way to get through labor and it is not a problem.

74. A patient’s (G2 P1001) initial visit reveals a healthy pregnant woman. Her urinalysis and culture and sensitivity (C&S) report indicates a colony count of greater than 100,000 organisms/mL. You would:
   a. refer her to a urologist to evaluate for underlying renal disease.
   b. encourage fluids and repeat C&S in two weeks.
   c. initiate treatment with antibiotics.
   d. advise her to contact you if she has any UTI symptoms.

75. Antepartal care for the woman who is HIV positive should focus mainly on:
   a. ensuring fetal well-being at all cost.
   b. frequent drug testing to ensure that she is not using IV street drugs.
   c. testing her partner and treating him if necessary.
   d. maintaining her health and preventing neonatal transmission.

76. On reviewing the record of a currently pregnant woman, you see that she is P1112. What obstetric history can you derive from this information?
   a. Two previous pregnancies of which one infant was term and one was a premature stillbirth
   b. You are unable to determine an obstetric history from this information
   c. Three pregnancies with one term birth and premature twins
   d. Three pregnancies, of which one was term, one premature, and one an abortion

77. Polyhydramnios is defined as:
   a. AFI greater than 10 cm.
   b. single pocket greater than 5 cm.
   c. AFI greater than 15 cm.
   d. single pocket greater than 8 cm.

78. Etiology of polyhydramnios is associated with:
   a. maternal overhydration.
   b. fetal anomalies of the GI tract.
   c. fetal anomalies of the cardiovascular system.
   d. maternal preeclampsia with edema.

79. The fetal system most associated with oligohydramnios is the:
   a. GI system.
   b. central nervous system.
   c. renal system.
   d. cardiovascular system.

80. When speaking with a primigravida about the way a baby develops, you would describe the embryonic stage as the:
   a. period between the second and eighth weeks.
   b. time from implantation to 12 weeks into pregnancy.
   c. period when drugs are least likely to affect development.
   d. period from fertilization to four weeks.
81. During the embryonic stage, all major organ systems are formed except the:
   a. heart.
   b. reproductive organs.
   c. liver.
   d. lungs.

82. Determining an accurate estimated date of birth (EDB) is critical because:
   a. it is the basis for making decisions toward the end of the pregnancy.
   b. mothers want to know the exact date the baby will be born.
   c. it is all that is needed to plan a 37-week elective C-section.
   d. families want to make plans around the baby's birth.

83. Which of the following would not be a normal physical examination finding during pregnancy?
   a. Blue color of vaginal mucosa and cervix
   b. Hypertrophy of nasal mucosa and gums
   c. Mildly enlarged, nodular thyroid
   d. Thickening of vaginal mucosa

84. During the last eight weeks of pregnancy, the fetus:
   a. finishes the final formation of the renal system.
   b. completes the development of reproductive organs.
   c. experiences the closure of the foramen ovale.
   d. increases weight through fat accumulation.

85. The determination of an accurate EDB is best accomplished by using:
   a. the first day of the last menstrual period.
   b. a complete menstrual history.
   c. the use of Naegele's rule.
   d. the date when symptoms of pregnancy began.

86. Dating of pregnancy by USG is most accurate in the first trimester using:
   a. crown rump length (CRL).
   b. head circumference.
   c. abdominal circumference.
   d. femur length.

87. Which of the following statements most accurately reflects the growth of the pregnant uterus?
   a. At 14 weeks, it begins to rise out of the pelvis and at 24 weeks is at the umbilicus.
   b. At 14 weeks, it is halfway to the umbilicus and at 20 weeks is at the umbilicus.
   c. At 12 weeks, it begins to rise out of the pelvis and at 20 weeks is at the umbilicus.
   d. At 10 weeks, it begins to rise out of the pelvis and at 16 weeks is at the umbilicus.

88. Which of the following is a presumptive sign of pregnancy seen in the vagina?
   a. Hegar's
   b. Piskacek's
   c. Goodell's
   d. Chadwick's

89. The pregnancy is maintained through hormones produced by the:
   a. egg sac and placenta.
   b. corpus luteum and chorion.
   c. corpus luteum and placenta.
   d. ovary and placenta.

90. Of the four pelvic types, which is more likely to lead to a posterior position with higher possibility of dystocia?
   a. Android
   b. Platypelloid
   c. Anthropoid
   d. Gynecoid

91. The characteristic gait of pregnancy results from:
   a. a shift in the center of gravity as the uterus enlarges.
   b. effects of relaxin and estrogen.
   c. effects of relaxin and progesterone.
   d. effects of increasing amounts of estrogen and progesterone.

92. The effect of pregnancy on the cardiovascular system is most clearly seen in:
   a. lower diastolic blood pressure in the third trimester.
   b. 10% cardiac volume increase that peaks in midpregnancy.
   c. resting pulse increase of 10–15 beats in the first trimester.
   d. slight decrease in cardiac output in the second trimester.

93. The usual 1-g drop in hemoglobin during pregnancy is due to:
   a. a blood volume increase of 30–50%.
   b. a decrease in iron absorption.
   c. a decrease in production of RBCs.
   d. the increasing iron needs of the fetus.

94. Which of the following is considered a risk factor for psychological well-being in pregnancy?
   a. Limited support network
   b. Introversion at any point
   c. Ambivalence any time
   d. Concern about the danger signs

95. The maternal mortality ratio is defined as the number of maternal deaths that result from the reproductive process per:
   a. 1,000 live births.
   b. 100,000 live births.
   c. 100,000 pregnant women.
   d. 100,000 reproductive-age women.

96. A patient comes for her first pregnancy visit. Her obstetric history includes one spontaneous abortion, one termination of pregnancy, one infant born at 36 weeks, and one born at 41 weeks. Both infants are living. Her parity is:
   a. 2022.
   b. 2122.
   c. 1212.
   d. 1122.

97. The pelvic planes of obstetric significance are the:
   a. inlet, midplane, and outlet.
   b. inlet, posterior outlet, and anterior outlet.
   c. inlet, posterior midplane, and anterior midplane.
   d. linea terminalis, posterior outlet, and anterior outlet.

98. Which of the elements of clinical pelvimetry defines the midplane?
   a. Diagonal conjugate
   b. Intertuberosus diameter
   c. Ischial spines distance and sacrum
   d. Pubic arch

99. Amniocentesis is used in early pregnancy to:
   a. screen for fetal anomalies.
   b. diagnose fetal genetic well-being.
   c. evaluate maternal genetic problems.
   d. determine AFI and muscle tone.
100. Chorionic villous sampling (CVS) has an advantage over amniocentesis because:
   a. it can be done three to four weeks earlier.
   b. there is less risk for infection.
   c. there is less risk for limb deformities.
   d. there is greater specificity in test results.

101. When considering the use of fetal movement counting for a particular woman, it is important to know that:
   a. fetuses move constantly, so the counting can be done at any time.
   b. fetal movement is strongest at 29–38 weeks.
   c. most women do not feel the fetus move before 24 weeks.
   d. there is only one way to perform fetal movement counts.

102. The basis for the nonstress test (NST) to assess fetal well-being is that:
   a. fetal movement will increase the mother's heart rate.
   b. the fetus responds to an increase in heart rate by accelerating movement.
   c. fetal movement should cause no significant change in FHR.
   d. fetal heart rate accelerates in association with fetal movement.

103. Contraindications to the contractions stress test (CST) include:
   a. gestational age greater than 37 weeks.
   b. history of ectopic pregnancy.
   c. nonreactive nonstress test (NST).
   d. placenta previa.

104. Cordocentesis may be used:
   a. as an adjunct to chorionic villus sampling (CVS).
   b. to obtain blood samples for fetal fibronectin test.
   c. to provide fetal blood transfusion.
   d. to relieve pressure on a prolapsed cord.

105. Substances classified as addictive:
   a. are only illegal drugs.
   b. include only those inhaled or injected.
   c. include both legal and illegal drugs.
   d. do not include alcohol.

106. Which of the following is most common during pregnancy?
   a. Binge drinking
   b. Cigarette smoking
   c. Marijuana smoking
   d. Occasional alcohol use

107. When faced with a woman who manifests clear evidence of being a victim of violence, your first goal is to:
   a. evaluate her safety.
   b. get her to a shelter.
   c. tell her to press charges.
   d. get photos of all injuries.

108. Correct information concerning pregnancies with first-trimester bleeding includes which of the following?
   a. Approximately 10% of women have some bleeding in the first trimester.
   b. Bleeding that occurs between 10 and 12 weeks is often caused by implantation.
   c. Cervical incompetence is a common cause of first-trimester bleeding.
   d. Ninety percent of pregnancies in which FHT are heard will continue to term after early bleeding.

109. A patient presents with an LMP of eight weeks ago and a positive urine pregnancy test. She is having a small amount of bleeding for the past 12 hours, along with some mild abdominal cramping. A pelvic exam reveals a closed cervix and a slightly enlarged uterus. Differential diagnosis for this woman includes:
   a. complete abortion and threatened abortion.
   b. ectopic pregnancy and inevitable abortion.
   c. ectopic pregnancy and threatened abortion.
   d. incomplete abortion and inevitable abortion.

110. An example of an autosomal recessive disease is:
   a. BRCA2 breast cancer.
   b. cystic fibrosis.
   c. hemophilia.
   d. trisomy 21.

111. A woman at 34 weeks tells you that she noticed a small amount of blood on her underwear this morning about an hour after having sexual intercourse. She is not having any pain or contractions. Your initial differential diagnosis for this woman would include:
   a. cervicitis.
   b. incompetent cervix.
   c. placental abruption.
   d. premature rupture of membranes.

112. Risks to the fetus in a post-term pregnancy are related to all of the following except:
   a. fetal macrosomia.
   b. meconium aspiration.
   c. polyhydramnios.
   d. uteroplacental insufficiency.

113. Symmetric growth restriction is more likely than asymmetric growth restriction to:
   a. be related to multiple gestation.
   b. become apparent first in late pregnancy.
   c. occur as a result of maternal medical illness.
   d. result from maternal cigarette smoking.

114. Loss of a fetus in the second trimester is most frequently related to:
   a. hydatidiform mole.
   b. inevitable abortion.
   c. ectopic pregnancy.
   d. incompetent cervix.

115. As a result of an early ultrasonography, a low-lying placenta is verified. What do you tell the patient?
   a. Approximately 30% of women with low-lying placenta in early pregnancy will have placenta previa in the third trimester.
   b. Approximately 30% of women have a low-lying placenta in the first trimester.
   c. Regular vaginal examinations will be done in the third trimester to monitor any obstruction of the cervix.
   d. Vaginal delivery is contraindicated if there is a marginal placenta previa.

116. A pregnant woman has the following history: vaginal delivery at 38 weeks; spontaneous abortion at 8 weeks; elective abortion at 13 weeks; vaginal delivery at 34 weeks; two living children; now 28 weeks pregnant. Her gravity and parity are:
   a. G5 P1122.
   b. G5 P0222.
   d. G3 P2112.
At an initial prenatal visit, a woman is diagnosed with bacterial vaginosis. She is not having any symptoms of vaginal infection. You tell her which of the following?

a. All pregnant women should be treated if they have asymptomatic bacterial vaginosis.
b. Pregnant women who are at risk for preterm delivery should be treated if they have asymptomatic bacterial vaginosis.
c. Only pregnant women at risk for preterm delivery should be treated for symptomatic bacterial vaginosis.
d. Pregnant women who are at risk for preterm delivery should be tested for asymptomatic bacterial vaginosis early in the third trimester.

117. Which of the following tests is diagnostic rather than screening?
   a. MSAFP
   b. Nuchal translucency US
   c. Amniocentesis
   d. USG at 10 weeks

118. An elevated maternal AFP result is associated with which of the following?
   a. Down syndrome
   b. Neural tube defect
   c. Autosomal recessive gene
   d. X-linked recessive inheritance

119. Which of the following factors would predispose a pregnant woman to having a baby with GBS disease?
   a. History of previous GBS-positive infant
   b. Bacterial vaginosis in current pregnancy
   c. Frequent urinary tract infections prior to pregnancy
   d. Streptococcal pharyngitis in the third trimester

120. A patient comes for her 38-week visit, during which she reports that her friend gave birth last week and had a placental abruption. She is now concerned that she might have the same. What information would you share with her about this?
   a. In the event of bleeding near term, 50% of cases are related to placental abruption.
   b. In the third trimester, she has a 30% chance of having a placental abruption.
   c. The likelihood of her having a placental abruption occurs is basically zero at this time.
   d. A placental abruption is associated with risk factors such as hypertension, smoking, and trauma.

121. Genotype refers to the:
   a. expression of genes present in an individual.
   b. dominant genes that will be inherited by a fetus.
   c. pair of genes for each characteristic inherent in an individual.
   d. recessive genes that will be passed on to a fetus.

122. Which of the following women should receive RhoGAM postpartum?
   a. Nonsensitized Rh negative mother with an Rh negative baby
   b. Nonsensitized Rh negative mother with an Rh positive baby
   c. Sensitized Rh negative mother with an Rh negative baby
   d. Sensitized Rh negative mother with an Rh positive baby

123. Aneuploidy describes which of the following situations?
   a. Down syndrome
   b. BRCA1 and BRCA2 inheritance
   c. Cystic fibrosis genes
   d. Sickle cell anemia

124. A patient, G2 P0010, comes for her first antepartal visit. Her history indicates that she had a pregnancy loss at 18 weeks. She is gravely concerned that it will happen again in this pregnancy. You discuss cervical cerclage and mention which of the following?
   a. It will be done after 12–14 weeks and is 80–90% successful.
   b. It will be done after 16–20 weeks and is 80–90% successful.
   c. It will be done after 16–20 weeks and is 50–60% successful.
   d. It will be done after 12–14 weeks and is 50–60% successful.

125. The CDC's recommended treatment for primary syphilis in a 10-week-pregnant woman is benzathine penicillin G 2.4 units IM:
   a. × 1 dose after the first trimester.
   b. × 1 dose at the time of diagnosis.
   c. weekly × three doses.
   d. at the time of diagnosis and repeat in four weeks if no decline in RPR titer.

126. In the third trimester, she has a 30% chance of having a placental abruption. Aneuploidy describes which of the following situations?
   a. BRCA1
   b. BRCA2
   c. Cystic fibrosis genes
   d. Sickle cell anemia

127. The CDC’s recommended treatment for trichomoniasis during pregnancy is:
   a. metronidazole 2 g orally.
   b. clindamycin 300 mg orally bid × 7 days.
   c. azithromycin 1 g orally.
   d. ceftriaxone 125 mg IM.

128. Symmetric intrauterine growth restriction:
   a. generally becomes evident in midpregnancy.
   b. is usually associated with placental abnormalities.
   c. is caused by conditions that result in a reduction in cell size.
   d. is a neonatal diagnosis made when the infant falls below the 10th percentile.

129. The 1-hour 50-g glucose challenge test at 28 weeks for a 34-year-old G5 P4004 was 154 mg/dL. Follow-up 100-g glucose tolerance test produced the following results: 100, 192, 185, and 160 mg/dL. Your plan for the patient includes:
   a. obtaining fasting glucose tests at 32 and 36 weeks to ensure that levels stay at or below 100 mg/dL.
   b. referring her to a nutritionist to help her limit further weight gain to no more than 10 lb.
   c. referring her to a perinatologist for periumbilical blood sampling to determine fetal blood glucose levels.
   d. screening for diabetes at 6–12 weeks postpartum.

130. The fundal height for a pregnant woman at 20 weeks' gestation was 1 cm below the umbilicus. At today's 24-week visit, fundal height is at the umbilicus. She is feeling regular fetal movement and fetal heart rate is 140 bpm. The most appropriate management for this patient is:
   a. ordering a biophysical profile.
   b. ordering an ultrasound.
   c. performing a nonstress test at this visit.
   d. scheduling her next visit for four weeks from today.

131. Ectopic pregnancy is consistent with no intrauterine sac on transvaginal ultrasound and an hCG titer of less than:
   a. 100 IU/L.
   b. 1,500 IU/L.
   c. 6,500 IU/L.
   d. 10,000 IU/L.

132. An 18-year-old female is 16 weeks pregnant. She has a positive chlamydia test. Appropriate management includes:
   a. erythromycin base 500 mg orally qid for seven days and ceftriaxone 125 mg IM.
   b. azithromycin 1 g orally in a single dose and perform test of cure in three to four weeks.
   c. ofloxacin 300 mg orally bid for seven days and rescreen in the third trimester.
   d. spectinomycin 2 g IM now and repeat in one week.
133. A 29-year-old (G4 P2012) is at 41 weeks today. She complains of occasional cramping, denies leaking/bleeding, but states she passed her “mucus plug” yesterday. She asks how she will know if she is in labor because both her previous births were induced. You respond that:
   a. true labor occurs when contractions are 7–8 minutes apart and last for 45 seconds.
   b. real labor is when contractions are 2–3 minutes apart and are very painful.
   c. labor contractions usually become more regular and more intense over time.
   d. contractions begin slowly; once they are 4–5 minutes apart, it is real labor.

134. Hyperthyroidism in pregnancy is diagnosed by:
   a. elevated free thyroxine (FT₄) levels.
   b. low free T₃ levels.
   c. elevated TSH.
   d. elevated total thyroxine (TT₄) levels.

135. ABO incompatibility occurs in which percentage of pregnancies?
   a. 15%
   b. 20–25%
   c. 25–40%
   d. 5–8%

136. A 32-year-old G2 P1001 is Rh negative. Her first pregnancy was uneventful, and she received RhoGAM after the birth. She read on the Internet that problems were much more likely with the second pregnancy. You respond that:
   a. because she reports that she has had no transfusions since the previous birth, there is no problem.
   b. the RhoGAM she received in the last pregnancy will prevent any problems in this pregnancy.
   c. she was not sensitized in the first pregnancy, and you will provide monitoring and treatment to prevent it in this pregnancy.
   d. it is likely that her fetus is Rh−, so there is no real concern that she will have any problems related to this.

137. At 28 weeks' gestation, a patient's Hgb is 12.4. g/dL. At her initial first-trimester visit, her Hgb was 12.8 g/dL. Management will include:
   a. obtaining a CBC and ferritin level.
   b. asking if she is having difficulty tolerating her iron supplement and changing to a different type if needed.
   c. rechecking her history to see if she may be at risk for an inherited anemia.
   d. encouraging her to continue getting dietary iron and taking her iron supplement.

138. Folic acid deficiency anemia is characterized by:
   a. hemoglobin at 9 g/dL or less.
   b. low ferritin levels.
   c. elevated serum iron-binding capacity.
   d. macrocytic erythrocytes.

139. Which of the following statements is true concerning sickle cell hemoglobinopathies?
   a. Trait indicates that one parent has sickle cell disease.
   b. Disease is present when the person inherits a sickle cell gene from each parent.
   c. G-6-PD deficiency is a potential complication of sickle cell disease.
   d. One in 100 African Americans has sickle cell trait.

140. Normal changes of pregnancy may confound a diagnosis of appendicitis. With this in mind, one should note the following as critical signs or symptoms pointing to possible appendicitis in pregnancy:
   a. persistent abdominal pain and tenderness.
   b. intermittent lower abdominal cramping.
   c. elevated WBC level.
   d. nausea and vomiting.

141. A 32-year-old (G1P1001), during a discussion of infant care and breastfeeding, says, "My first baby did not like the breast, then I did not have enough milk, so I stopped breastfeeding after two weeks." What is your response to her statement?
   a. Tell her she probably misinterpreted what was going on and should not have stopped nursing.
   b. Delve further into what occurred and how she came to the conclusions that led her to stop breastfeeding.
   c. Let her know that she probably was not drinking enough fluids, so she did not have enough milk to feed the baby.
   d. Reassure her that she was listening to her body and had done the right thing for herself and her infant.

142. A patient (G1 P0) comes for her 36-week visit with a piece of paper in her hand. "I am really confused about this birth plan business. What am I supposed to do about my birth? Don't I just show up when I am in labor?" How will you counsel her today?
   a. "It really does not matter what you write because the hospital has its own plan."
   b. "You will need to be very detailed about each element of the birth experience so you get what you want."
   c. "The plan provides the opportunity for you to make choices about events associated with the birth."
   d. "The healthcare provider who is there when you are in labor will tell you what is best for you and how to do it."

143. A patient (G2 P1001) comes for her first visit. She is concerned about the possibility of a UTI since her sister was recently hospitalized for pyelonephritis. What facts would you give her to enhance her understanding?
   a. UTIs do occur in about 10% of pregnancies.
   b. Twenty-five percent of women with UTI in pregnancy will develop pyelonephritis.
   c. If she has a history of UTIs before pregnancy, she will be screened with a urine culture each trimester.
   d. Pregnant women are typically screened for asymptomatic bacteruria in early pregnancy.

144. Who is at greatest risk for developing a UTI in pregnancy?
   a. Adolescents
   b. Woman pregnant with twins
   c. Women older than 35 years
   d. Woman with diabetes

145. A patient returns for the reading of the PPD that was placed during her first prenatal visit. You read the result as 10 mm of induration. The patient is American-born and healthy, and has no known history of contact with the disease. How do you interpret this result for her?
   a. It is positive and she needs referral to an infectious disease specialist.
   b. It is unclear and she should have a chest radiograph to be certain.
   c. It is positive and you should give her a prescription for INH.
   d. It is negative because she has no high-risk characteristics for the disease.
146. Which of the following statements concerning HIV in women is true?
a. The main route of acquiring the infection in women is IV drug use.
b. Viral load is the strongest predictor for transmission of infection to the infant during the birth process.
c. C-section is the recommended route of delivery for all HIV-infected women to reduce the risk of transmission of infection to the infant.
d. Breastfeeding should be recommended only if the mother’s viral load is less than 200 copies/mL.

147. A patient has reached her thirty-ninth week of pregnancy. On abdominal exam, you measure a fundal height of 42 cm. Leopold’s maneuvers provide you with an EFW of 4,200 g. What factors would help to ease your mind about the fetal size?
a. She has wide hips and will have no problem with a big baby.
b. She is 5 ft 10 in with an anthropoid pelvis and her husband is 6 ft 4 in.
c. She is totally unconcerned and knows this baby will fit.
d. The fetus is not yet engaged, so the height is greater than expected.

148. A patient who is 32 weeks pregnant has had symptoms of preterm labor and has a history of preterm delivery at 34 weeks. A fetal fibronectin test is negative. You advise her that:
a. she has a 60% chance of going into labor within the next week.
b. it is really too early in her pregnancy for this test to be of much value.
c. the result offers some reassurance that she will not go into labor in the next two weeks.
d. it is really too late in her pregnancy for this test to be of much value.

149. A decision is made to start tocolytic therapy for a 30 weeks’ gestation woman in preterm labor. Betamethasone IM has also been ordered because the administration of corticosteroids:
a. decreases the respiratory side effects of tocolytic drugs.
b. decreases the incidence of premature rupture of membranes.
c. enhances the effects of tocolytic drugs.
d. reduces the incidence of newborn respiratory distress syndrome.

150. A patient comes for her 32-week visit, and you determine she has a breech presentation. Your plan for her is to:
a. send her to Maternal Fetal Medicine for external cephalic version.
b. refer her to a perinatologist for a care decision and treatment.
c. send her for ultrasound to confirm breech presentation.
d. wait until 36 weeks to see if spontaneous version has occurred.

151. A pregnant woman presents for her 32-week visit with no complaints. All findings from previous visits have been normal. Today she has blood pressure of 145/95 mm Hg. Expected additional findings if she has mild preeclampsia include:
a. lower extremity edema.
b. serum creatinine > 1.1 mg/DL.
c. right upper epigastric pain.
d. elevated liver function tests.

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**Answers with Rationales**

1. b. presumptive.
   Amenorrhea is a presumptive sign of pregnancy. *Presumptive signs of pregnancy* refers to signs and symptoms that may be caused by something else. Amenorrhea may be caused by sickness or stress.

2. c. repeat the test in a week.
   The patient performed the test too early, so she needs to repeat the test in one week. Sensitive urine pregnancy tests can detect pregnancy approximately one week after conception.

3. b. human chorionic gonadotropin.
   Human chorionic gonadotropin (hCG) hormone is secreted by the placenta to help maintain corpus luteum function and production of progesterone. Levels found in serum and urine assays of pregnant women are detected in pregnancy tests.

4. b. corpus luteum.
   Progesterone is secreted by the corpus luteum. Progesterone is essential in preparing the uterus for implantation of the fertilized ovum and maintaining the pregnancy.

5. d. fetus.
   The chorionic villi develop from the outer wall of the blastocyst, which establishes an intimate connection with the endometrium and gives rise to the placenta.

6. a. one vein with oxygenated blood and two arteries with deoxygenated blood.
   The vessels of the umbilical cord are two arteries that carry fetal deoxygenated blood to the placenta and that are smaller in diameter than the vein, and one vein that carries oxygenated blood from the placenta to the fetus and that is characterized by twisting or spiralizing to minimize snarling.

7. c. 12 weeks.
   The uterus is palpable at the symphysis pubis at 12 weeks. This is also the time that the fetus begins to make spontaneous movements in utero.

8. c. 6–7 days
   Implantation occurs 6–7 days after fertilization and usually in the upper, posterior wall of the uterus.

9. b. facilitated diffusion.
   Both oxygen and glucose are transported across the placenta via facilitated diffusion.

10. d. 23 pairs of chromosomes.
    The human zygote consists of the haploid number of chromosomes: 23 pairs. It possesses half the diploid or normal number of pairs of chromosomes, 46 pairs, found in somatic, or body, cells.

11. a. placenta.
    The trophoblast is an essential component of the placenta.

12. d. no intervention.
    Ninety percent of pregnant women develop a physiologic systolic heart murmur and may have exaggerated splitting of S1,audible third sound, or soft transient diastolic murmur.

13. b. progesterone’s effect on vessel walls.
    Diastolic blood pressure is lower in the first two trimesters because of the development of new vascular beds and the relaxation of peripheral tone by progesterone, which result in decreased flow resistance.
14. c. increased chest diameter. Thoracic circumference increases by 5–6 cm, and residual volume decreases.

15. c. reassure her that this is normal. Absent any other symptoms besides increased vaginal discharge in a 34-week pregnant woman, and without odor or other presenting abnormal findings, reassurance may be given to the mother that an increase in vaginal discharge is normal in pregnancy. If there is further concern, rule out pathology.

16. a. a normal variation of response in pregnancy. Increase libido is a normal variation of response in pregnancy.

17. b. encourage her to tell you more about the nightmares and her fears. It is the healthcare provider’s role to listen and facilitate a patient’s expression of feelings and to provide a nonjudgmental environment.

18. d. increased intake of fiber and fluids. The first line of treatment for constipation is to increase fluids and fiber. Other strategies are to recommend prune juice or a warm beverage in the morning and to encourage exercise and stool softeners.

19. b. nullipara. Nullipara is the term for a woman who has not carried a baby to 500 g or 20 weeks.

20. a. 28-day menstrual cycle. The calculation of estimated date of birth (EDB) by Naegle’s rule is based on a 28-day menstrual cycle, accounting for the average length of pregnancy to be 280 days, or 10 lunar months.

21. a. 0121. A. The patient has not had any term pregnancies, which accounts for the first number, 0. She had a preterm delivery at 36 weeks of twins, which accounts for the second number, and even though these were twins, they still count as one number, thus, a 1. She had two miscarriages under 20 weeks, which accounts for the third number, a 2. The fourth number is the total number of living children. One of the patient’s twins died; therefore, she has only one living child.

22. c. Send her to fetal assessment unit for an ultrasound. If uncertain of the last menstrual period (LMP), ultrasound may be used to calculate estimated gestational age.

23. a. intrauterine growth restriction (IUGR). The fundus is typically found at the umbilicus at 20 weeks.

24. d. lie. The first maneuver for Leopold’s is to palpate the fetal lie, followed by the presentation, position, and attitude.

25. b. “We can try to listen today. But we may not hear the heartbeat yet.” Fetal heart tones can be auscultated by Doppler as early as 10 weeks, but this is done more commonly at 12 weeks.

26. a. bluish color of the cervix. A normal finding in pregnancy is the Chadwick’s sign—the changing of the color of the cervix to a bluish hue.

27. c. Pubic arch of 90 degrees with diagonal conjugate of longer than 11.5 cm. The pubic arch is formed by the descending rami of pubic bones and the inferior margin of the symphysis pubis; the angle should be at least 90 degrees.

28. b. identify the characteristics of the woman’s pelvis. Identifying the characteristics of the woman’s pelvis is clinically significant because the pelvis is the bony canal through which the fetus passes.

29. a. “Most women with their first pregnancy do not feel movement until around 20 weeks.” Quickening is the maternal perception of fetal movement, which usually occurs between 18 and 20 weeks for primiparas; it occurs earlier for multigravidas, at about 14–18 weeks.

30. c. 15–19 weeks Second-trimester screening (also known as multiple marker screening) is performed between 15 and 20 weeks to detect neural tube defects and trisomy 18 and 21. Serologic testing measuring maternal serum alphafetoprotein (MSAFP), estriol, and hCG is called a triple screen; with the addition of inhibin A, this becomes a quad screen.

31. d. At 35–37 weeks Group B streptococcus (GBS) screening is performed at 35–37 weeks by swabbing the vaginal introitus and rectal specimens.

32. b. AFP, estriol, hCG. Second-trimester screening (also known as multiple marker screening) is performed between 15 and 20 weeks to detect neural tube defects and trisomy 18 and 21. Serologic testing measuring maternal serum alphafetoprotein (AFP), estriol, and human chorionic gonadotropin (hCG) is called a triple screen; with the addition of inhibin A, this becomes a quad screen.

33. d. reactive. Reactive constitutes two or more accelerations in fetal heart rate of 15 or more beats per minute lasting for 15 seconds or more within a 15- to 20-minute period.

34. a. 4 mg per day starting before conception. A 0.4-mg daily supplement of folic acid is recommended for women of childbearing age, and a 4-mg daily supplement prior to and during pregnancy is recommended for women with a history of previous infant with neural tube defect.

35. b. gain 11–20 lb. For obese women who have a prepregnancy BMI > 30, the recommended weight gain is 0.4–0.6 lb per week in the second and third trimesters, for a total of 11 to 20 lb.

36. c. modify the existing program if symptoms occur. In the absence of either medical or obstetric complications, 30 minutes or more of moderate exercise a day on most, if not all, days of the week is recommended for pregnant women.

37. c. The pregnant woman’s sexual desire may change throughout pregnancy. Changes in sexual desire throughout pregnancy are influenced by hormones, energy level, the relationship with the sexual partner, body image, fears of hurting the baby, and cultural beliefs and practices.

38. b. all pregnant women who are not HIV positive. Breastfeeding is recommended for all women except for women who are HIV positive and are untreated, have active tuberculosis (TB), use illicit drugs, or take prescribed cancer chemotherapy agents.

39. c. advising her to eat small, frequent meals. Nausea and vomiting of pregnancy are most common in the first trimester. It is recommended that patients eat small, frequent
meals, with no restriction on the kind of food or how often.
Education includes discontinuing prenatal vitamins with iron until
nausea and vomiting have resolved but to continue folic acid. Other
recommendations may include consuming raspberry tea, pepper-
mint tea, carbonated beverages, or hard candy; using acupressure,
including sea bands for wrists; taking ginger 1 g per day in divided
doses, pyridoxine (vitamin B₆) 25 mg bid or tid orally, doxylamine
12.5 mg bid or qid with pyridoxine orally, metoclopramide 5
to 10 mg q 6–8 h orally, or promethazine 25 mg q 4 h per rectal
suppository.
40. d. reassurance and rest.
Provide patients with reassurance that fatigue is a normal
first-trimester problem and will pass. Other recommendations
include getting mild exercise and good nutrition, decreasing activi-
ties and planning rest periods, and decreasing fluid intake in the
evening to decrease nocturia.
41. c. flexion of the foot.
Leg cramps may be relieved by flexing the ankle to stretch the
calf, decreasing phosphate in the diet, drinking no more than two
glasses of milk per day, massaging the affected leg, keeping the
legs warm, walking, exercising, and taking calcium tablets and
magnesium tablets.
42. b. Explain that the edema at this stage is normal and see her in a
week
The patient is gaining appropriate weight and is normotensive,
without protein in her urine, and without any severe features of
preeclampsia. She can be reassured that edema at this stage in the
pregnancy is normal and that if she exhibits any other symptoms,
she would need to be evaluated by a healthcare provider.
43. a. reduced use of analgesics/anesthesia during labor.
Preparation for childbirth ultimately aids in reducing the need for
analgesics and anesthetics during labor.
44. c. routine screening early in pregnancy and at 24–28 weeks.
High-risk women need to be screened for diabetes as soon as
possible using standard diagnostic testing.
45. d. polyhydramnios.
Polyhydramnios is indicated by uterine size larger than expected
for gestational age (GA), difficulty auscultating fetal heart rate
(FHR) and palpating fetal parts, and mechanical pressure exerted
by the large uterus.
46. d. refer to a perinatologist
There are no documented cases of congenital rubella syndrome
from vaccine, but it is recommend giving the vaccine at least
4 weeks before attempting a pregnancy or postpartum; the vaccine
may be given while breastfeeding.
47. b. advise her you will watch at each visit to assess for any change.
This well-defined, nontender mass has benign characteristics and
would be okay to watch. A malignant breast mass is usually non-
tender, firm, irregularly shaped, and fixed to underlying tissue.
48. c. 145 lb
Weight gain recommendations in pregnancy: for underweight
women (BMI less than 18.5), 1.0–1.3 lb per week in the second and
third trimesters for total of 28–40 lb; for normal weight women
(BMI 18.5–24.9), 0.8–1.0 lb per week during the second and third
trimesters for total of 25–35 lb; for overweight women (BMI 25.0–
29.9), 0.5–0.7 lb per week in the second and third trimesters for
total of 15–25 lb; for obese women (BMI 30.0 or higher), 0.4–0.6 lb
per week in the second and third trimesters for total of 11–20 lb.
49. a. A combination of nonstress test and ultrasound evaluation to
assess five variables.
A biophysical profile consists of five parameters: nonstress test,
breathing, movement, tone, and amniotic fluid volume.
50. c. Schedule a return visit after one week.
A BPP score of 8/10 is a reassuring, normal score. BPP scoring
interpretation criteria are as follows: 8–10 is normal; 6 is equivocal,
repeat testing; 4 or less is considered abnormal and needs further
evaluation.
51. c. four times daily: fasting and one or two hours after each meal.
Based on available data, glucose monitoring for women diagnosed
with gestational diabetes is to check their blood sugar levels four
times daily: fasting, and one or two hours after each meal.
52. c. the tetanus booster can be given in pregnancy if needed.
Tetanus vaccination during pregnancy can protect at-risk newborns
against neonatal tetanus; in maternal trauma, it may be indicated.
53. c. Category C
For drugs in Category C, animal studies have shown an adverse
effect or no animal studies have been conducted, and there are no
adequate and well-controlled studies in pregnant women.
54. a. multigravida.
Multigravida is a woman pregnant two or more times, regardless of
the result of the pregnancies.
55. d. get her to talk about what she is feeling and thinking about sex.
It is the healthcare provider's role to listen and facilitate the pa-
tient's expression of feelings and to provide a nonjudgmental
environment.
56. d. vaginal introitus and rectum.
Group B streptococcus (GBS) screening is performed at 35–37
weeks by swabbing the vaginal introitus and rectal specimens.
57. b. listening to whatever the woman has to say.
It is the healthcare provider's role to listen and facilitate the pa-
tient's expression of feelings and to provide a nonjudgmental
environment.
58. b. syphilis serology.
Obtaining syphilis serology is a recommended routine screening for
the first initial antenatal visit during the first trimester.
59. a. Vaccination is recommended for all women who will be preg-
nant during the influenza season.
The trivalent inactivated influenza vaccine (TIV) is recommended
for all pregnant women during influenza season; live attenuated
nasal influenza vaccine is contraindicated during pregnancy.
60. d. 2,500 kcal and 60 g/day.
Recommended Dietary Allowance for pregnancy is 2,500 kcal/day
and 60 g/day of protein.
61. c. amniotic epithelium and fetal functions.
Amniotic fluid is produced by amniotic epithelium. Water transfers
across the amnion and through fetal skin. In the second trimester,
the fetus starts to swallow, urinate, and inspire amniotic fluid.
62. b. Meiosis occurs, producing half the number of chromosomes.
Meiosis is the process of two successive cell divisions, producing
cells, egg, or sperm, that contain half the number of chromosomes
found in somatic cells.
63. a. Trophoblasts, chorion, amnion
Parts of the placenta are trophoblasts, chorion, amnion and
chorionic villi, intervillous spaces, and decidual plate.
64. c. The embryo, membranes, and placenta
A conceptus comprises all tissue products of conception: embryo (fetus), fetal membranes, and placenta.

65. a. Trophoblast
Human trophoblasts produce more diverse steroid and protein hormones and in greater amounts than does any endocrine tissue in all of mammalian physiology.

66. b. finding which direction the fetus is lying.
Leopold's maneuvers consist of four abdominal palpation maneuvers used to determine the following fetal characteristics: lie, presentation, position, and attitude.

67. d. multiple marker screen.
Second-trimester screening (also known as multiple marker screening) is performed between 15 and 20 weeks to detect neural tube defects and trisomy 18 and 21.

68. c. fetal heart rate response to fetal movement.
A nonstress test (NST) is a method to assess fetal well-being by observing the fetal heart rate response to fetal movement.

69. b. gingivitis is common in pregnancy with increased vascularity of connective tissue.
Gingivitis is common and may result in bleeding of gums.

70. b. placental abruption.
Placental abruption is premature separation of the placenta from the uterus that may be partial or complete. Signs of placental abruption include vaginal bleeding, uterine tenderness and rigidity, contractions or uterine irritability and/or tone, and fetal tachycardia or bradycardia.

71. a. certain LMP.
Dating a pregnancy is most accurate with a certain last menstrual period (LMP).

72. b. monitor for persistent trophoblastic proliferation.
Weekly serial beta hCG levels are recommended after surgical evacuation for hydatidiform mole to monitor for persistent trophoblastic proliferation and identify metastatic disease, including choriocarcinoma.

73. c. discuss alternate methods to promote uterine readiness and contractions.
Pitocin (oxytocin injection) may be utilized to help initiate or facilitate labor by stimulating contraction of the uterine smooth muscle. There are other methods to promote uterine readiness and contractions, such as nipple stimulation.

74. c. initiate treatment with antibiotics.
A diagnosis of a urinary tract infection can be made by finding 100,000 colonies of pathogenic bacteria in a urinary culture. Treatment with appropriate antibiotics is necessary. Untreated asymptomatic bacteriuria may lead to pyelonephritis, which may cause serious complications for both mother and baby.

75. d. maintaining her health and preventing neonatal transmission.
Maintaining the health of the woman and preventing vertical transmission to the neonate are the priorities when caring for women with HIV.

76. d. Three pregnancies, of which one was term, one premature, and one an abortion.
The numbers represent a woman's obstetric history, TPAL: one term delivery, one preterm delivery, one abortion (spontaneous or elective), and two living children.

77. d. single pocket greater than 8 cm.
Polyhydramnios is an excess of amniotic fluid diagnosed as Amniotic Fluid Index greater than or equal to 24 cm or a maximum deepest vertical pocket of equal to or greater than 8 cm.

78. b. fetal anomalies of the GI tract.
Etiology of polyhydramnios may be due to central nervous system or gastrointestinal tract fetal anomalies.

79. c. renal system.
Oligohydramnios is associated with genitourinary abnormalities in the fetus.

80. a. period between the second and eighth weeks.
Embryonic development is the period of organogenesis, which begins in the third week after fertilization, and spans eight weeks; this is around the time a woman may miss her next menstrual period and when pregnancy tests would turn positive by detecting human chorionic gonadotropin (hCG).

81. d. lungs.
All major organ systems are formed during the embryonic stage except for the lungs.

82. a. it is the basis for making decisions toward the end of the pregnancy.
Determining an accurate estimated date of birth (EDB) is critical because an accurate estimation of the date of birth is the basis for making decisions toward the end of the pregnancy.

83. c. Mildly enlarged, nodular thyroid.
Having a mildly enlarged, nodular thyroid is an abnormal physical exam finding. The other findings are normal findings in pregnancy.

84. d. increases weight through fat accumulation.
During 32–36 weeks, the fetus continues to increase weight as more subcutaneous fat accumulates.

85. a. the first day of the last menstrual period.
A complete menstrual history, which includes determining the first day of the LMP and the length of menstrual cycles, allows for a more accurate EDB.

86. a. crown rump length (CRL).
In the first trimester, the most accurate parameter for dating is the crown rump length (CRL) measurement.

87. c. At 12 weeks it begins to rise out of the pelvis and at 20 weeks is at the umbilicus.
At 12 weeks' gestation, the uterus becomes an abdominal organ and rises out of the pelvis. At 20 weeks, the uterus is typically found at the umbilicus.

88. d. Chadwick's sign.
Chadwick's sign is a presumptive sign of pregnancy. Presumptive sign of pregnancy refers to signs and symptoms that may be caused by pregnancy. Amenorrhea may be caused by sickness or stress.

89. c. corpus luteum and placenta.
The corpus luteum is responsible for the secretion of progesterone to maintain the endometrium and pregnancy until the placenta takes over production.

90. a. Android.
An android pelvic type is commonly known as a male pelvis, and 32.5% of white women and 15.7% of nonwhite women have this type of heavy, heart-shaped pelvis, which leads to increased posterior positions, dystocia, and operative births.
91. c. effects of relaxin and progesterone.
   Relaxin and progesterone affect cartilage and connective tissue, resulting in a loosening of the sacroiliac joint and symphysis pubis.
92. b. 10% cardiac volume increase that peaks in midpregnancy.
   Cardiac volume increases by about 10% and peaks at about 20 weeks, and resting pulse increases by 10–15 beats per minute, with the peak at 28 weeks.
93. a. a blood volume increase of 30–50%.
   Blood volume increases 30–50% from nonpregnant levels and plasma volume expands, which result in a physiologic anemia.
94. a. Limited support network
   Risk factors for psychological well-being include limited support network, high levels of stress, psychological/mental health issues, and problem pregnancies.
95. b. 100,000 live births.
   Maternal mortality ratio is the number of maternal deaths that result from the reproductive process/100,000 live births.
96. d. 1122.
   TPAL represents a woman's obstetric history. The patient has one term pregnancy, one preterm, two abortions, and two live children.
97. a. inlet, midplane, and outlet.
   Three planes are of obstetric significance—inlet, midplane, and outlet.
98. c. Ischial spines distance and sacrum
   The distance between the ischial spines normally measures 10 cm, is the smallest diameter of the pelvis, and defines the midplane.
99. a. screen for fetal anomalies.
   Amniocentesis is used in early pregnancy to obtain amniotic fluid to be sent for chromosomal studies.
100. a. it can be done 3–4 weeks earlier.
   An advantage of chorionic villous sampling (CVS) over amniocentesis is that CVS can be performed between 10 and 13 weeks, 3–4 weeks earlier.
101. b. fetal movement is strongest at 29–38 weeks.
   Fetal movement is strongest between 29 and 38 weeks. Fetal movement counting is a safe, simple, no-cost, noninvasive fetal assessment technique. Research has demonstrated that fetal activity is a good predictor of well-being. Dramatic decrease or cessation of movement is cause for concern.
102. d. fetal heart rate accelerates in association with fetal movement.
   The nonstress test (NST) is a method to assess fetal well-being by observing the fetal heart rate response to fetal movement.
103. d. placenta previa.
   Contraindications for contractions stress test (CST) include previous classic C-section or myomectomy, placenta previa, the mother is at risk for preterm labor, gestational age less than 37 weeks, and multiple gestation.
104. c. to provide fetal blood transfusion.
   Cordocentesis is the process in which a needle is introduced under real-time ultrasound through the maternal abdomen and then into the umbilical cord. Blood is then aspirated or blood and/or medications are introduced into the fetus.
105. c. include both legal and illegal drugs.
   Both legal and illegal substances have the potential to be addicting.
106. b. Cigarette smoking
   According to Substance Abuse and Mental Health Services Administration (2014), 15.4% of pregnant women use tobacco, compared to 5.4% who use illicit drugs, 9.4% who drink alcohol, 2.3% who engage in binge drinking, and 0.4% who engage in heavy drinking.
107. a. evaluate her safety.
   The healthcare provider's primary goal when caring for a woman who is abused is to evaluate her safety.
108. d. Ninety percent of pregnancies in which FHT are heard will continue to term after early bleeding.
   Ninety percent of pregnancies with bleeding will continue to term after fetal heart tones (FHTs) are observed. Other information to discuss with your patient includes the following: 40% of women have some bleeding in the first trimester, and 80% of spontaneous abortions occur in the first 12 weeks.
109. c. ectopic pregnancy and threatened abortion.
   Differential diagnosis for bleeding in the first trimester includes implantation bleeding, threatened abortion, ectopic pregnancy, cervicitis, cervical polyps, vaginitis, trauma/intercourse, disappearing twin, and autoimmune disorder.
110. b. cystic fibrosis.
   Autosomal recessive trait is expressed only when both copies of the gene are the same, for example, cystic fibrosis and sickle cell anemia.
111. a. cervicitis.
   Painless bleeding after sexual intercourse at 34 weeks may be due to irritation of the cervix from cervicitis. There is usually painful bleeding associated with placental abruption. Premature rupture of membranes is typically associated with loss of fluid.
112. c. polyhydramnios.
   Post-term pregnancy is typically associated with decreased amniotic fluid and not excess.
113. d. result from maternal cigarette smoking.
   Symmetric growth restriction is associated with maternal use of drugs such as tobacco, alcohol, Dilantin (phenytoin), cocaine, and heroin.
114. d. incompetent cervix.
   Second-trimester fetal loss is most likely due to incompetent cervix. The other stated causes of fetal loss, hydatidiform mole, inevitable abortion, and ectopic pregnancy, are related to first trimester loss.
115. b. Approximately 30% of women have a low-lying placenta in the first trimester.
   One-third of women have low-lying placenta in the first trimester. Most will resolve, and only 1% have previa in the third trimester.
116. a. G5 P1122.
   The woman has five total pregnancies, including her current pregnancy, one term delivery, one preterm delivery, two abortions, and two living children.
117. c. Amniocentesis
   Amniocentesis is a diagnostic test for genetic evaluation or assessment of neural tube defects.
118. b. Neural tube defect
   An elevated maternal serum alphafetoprotein (AFP) is associated with neural tube defects, multiple gestation, and placental abruption.
119. a. History of previous GBS-positive infant
   Risk factors for group B streptococcus (GBS) disease include his-
   tory of previous GBS-positive infant, delivering early (before
   37 weeks' gestation), developing fever during labor, having a long
   period between water breaking and delivery, and having a previous
   infant with early-onset disease.

   120. d. Placental abruption is associated with risk factors such as
   hypertension, smoking, and trauma.
   Placental abruption risk factors include hypertension (chronic or
   gestational), trauma, smoking, cocaine use, multiparity, and uterine
   anomalies or tumors.

   121. c. pair of genes for each characteristic inherent in an individual.
   Genotype refers to the total hereditary information present in an
   individual, the pair of genes for each characteristic.

   122. b. Nonsensitized Rh negative mother with an Rh positive baby
   A nonsensitized Rh negative mother with an Rh positive baby
   needs RhoGAM postpartum to prevent future sensitization. A
   sensitized Rh negative mother does not need RhoGAM because she
   is already sensitized. A nonsensitized Rh negative mother with an
   Rh negative baby also does not need RhoGAM.

   123. a. Down syndrome
   Aneuploidy is an abnormal number of chromosomes in a cell.
   An abnormal number of chromosomes, the presence of extra
   chromosome 21, can be found in Down syndrome.

   124. a. It will be done after 12–14 weeks and is 80–90% successful.
   Cervical cerclage is done after 12–14 weeks and has a success-
   rate of 80–90%. There is a risk of ruptured membranes or infec-
   tion. There is a need to monitor cervical length via transvaginal
   ultrasound.

   125. b. × 1 dose at the time of diagnosis.
   The treatment for early syphilis in pregnant women is one dose of
   benzathine penicillin G 2.4 million units IM.

   126. b. Pregnant women who are at risk for preterm delivery should be
   treated if they have asymptomatic bacterial vaginosis.
   Treatment recommended for all pregnant women with symptoms
   of bacterial vaginosis: metronidazole 500 mg PO BID × seven days
   OR metronidazole 250 mg PO TID × seven days OR clindamycin
   300 mg PO BID × seven days.

   127. a. metronidazole 2 g orally.
   The treatment for trichomoniasis in pregnancy is metronidazole
   2 g PO × 1 at any stage of pregnancy.

   128. a. generally becomes evident in midpregnancy.
   Symmetric growth restriction appears around 18–20 weeks and
   is caused by congenital infections, chromosomal abnormalities,
   maternal drug use (tobacco, alcohol, Dilantin [phenytoin], cocaine,
   heroin), and increased risk of adverse long-term sequelae.

   129. d. screening for diabetes at 6–12 weeks postpartum.
   The patient's one-hour oral glucose tolerance test results are abnor-
   mal, and a diagnosis for gestational diabetes can be made. Thus, a
   screening for pregestational diabetes at 6–12 weeks postpartum is
   necessary.

   130. b. ordering an ultrasound.
   Ordering an ultrasound is the most appropriate management of the
   patient to evaluate fetal size and gestation. The patient is too early
   in gestation for a biophysical profile and a nonstress test. Waiting
   four weeks for an evaluation is too long to wait—the patient needs
   to be evaluated much sooner.

131. c. 6,500 IU/L.
   Ninety percent of ectopics have b-hCG less than 6,500 IU/L.

132. b. azithromycin 1 g orally in a single dose and perform test of cure
   in 3–4 weeks.
   Recommended treatment for chlamydia: azithromycin 1 g PO × 1 OR
   amoxicillin 500 mg orally TID × seven days. Alternative regimens:
   - Erythromycin base 500 mg PO QID × seven days
   - Erythromycin base 250 mg PO QID × 14 days
   - Erythromycin ethylsuccinate 800 mg PO QID × seven days
   - Erythromycin ethylsuccinate 400 mg PO QID × 14 days

133. d. contractions begin slowly; once they are 4–5 minutes apart, it
   is real labor.
   Labor usually begins with slow contractions that gradually become
   more regular and closer together. When contractions are 4–5
   minutes apart, this is a sign of real labor.

134. a. elevated free thyroxine (FT4) levels.
   Elevated serum free thyroxine (FT4) or free thyroxine index (FTI)
   levels indicate hyperthyroidism in pregnancy.

135. b. 20–25%
   Twenty percent to 25% of pregnancies are ABO incompatible.

136. c. she was not sensitized in the first pregnancy, and you will
   provide monitoring and treatment to prevent it in this pregnancy.
   The patient is Rh negative and received RhoGAM postpartum with
   her first pregnancy. She was not sensitized in the first pregnancy.
   She can be monitored and provided RhoGAM to prevent sensitiza-
   tion in this pregnancy.

137. d. encouraging her to continue getting dietary iron and taking her
   iron supplement.
   Average hemoglobin level in pregnancy is 12.5 g/dL. The patient's he-
   moglobin level is slightly below normal, and she can be encouraged to
   continue getting dietary iron and taking her iron supplement.

138. d. macrocytic erythrocytes.
   Folic acid deficiency anemia is characterized by laboratory tests
   showing macrocytic erythrocytes, hypersegmentation of neutro-
   philis, and bone marrow megaloblastic erythropoiesis.

139. b. Disease is present when the person inherits a sickle cell gene
   from each parent.
   Sickle cell anemia (SS disease) disease is present when the person
   inherits a sickle cell gene from each parent.

140. a. persistent abdominal pain and tenderness.
   Persistent abdominal pain and tenderness are the most critical
   symptoms of appendicitis.

141. b. Delve further into what occurred and how she came to the
   conclusions that led her to stop breastfeeding.
   It is the healthcare provider's role to listen and facilitate the
   patient's expression of feelings and to provide a nonjudgmental
   environment.

142. c. “The plan provides the opportunity for you to make choices
   about events associated with the birth.”
   It is the healthcare provider's role to listen and facilitate the pa-
   tient's expression of feelings and to provide a nonjudgmental
   environment.

143. d. Pregnant women are typically screened for asymptomatic
   bacteriuria in early pregnancy.
   Urinary tract infection (UTI) occurs in 2–7% of all pregnancies.
   UTI may be asymptomatic (asymptomatic bacteriuria), and
   25–30% will progress to pyelonephritis if left untreated.
144. d. Woman with diabetes
Women with diabetes are at greatest risk for urinary tract infection (UTI). Other risk factors include sickle cell trait and pregnancy.

145. d. It is negative because she has no high-risk characteristics for the disease.

PPD (purified protein derivative of tuberculin) test interpretation by risk factors:
• 5 mm is positive for very high risk—HIV positive, with abnormal chest radiograph, recent contact with active case.
• 10 mm is positive for high risk, that is, foreign born, HIV negative, IV drug user, low-income populations, associated medical problems.
• 15 mm is positive for those with none of these risks.

146. b. Viral load is the strongest predictor for transmission of infection to the infant during the birth process.

Viral load is the strongest predictor for vertical transmission.

147. b. She is 5 ft 10 in with an anthropoid pelvis and her husband is 6 ft 4 in.

The patient's anthropoid pelvis shape favors a posterior position of the fetus and is adequate for a vaginal birth of a large infant.

148. c. The result offers some reassurance that she will not go into labor in the next two weeks.

A negative result on a fetal fibronectin test is useful in ruling out imminent (within 14 days) preterm birth before 37 weeks' gestation (predictive value up to 94%).

149. d. reduces the incidence of newborn respiratory distress syndrome.

Corticosteroids such as betamethasone and dexamethasone are commonly used in women at risk for preterm delivery to reduce the risk of respiratory distress and cerebral hemorrhage in the newborn.

150. d. wait until 36 weeks to see if spontaneous version has occurred.

The incidence of breech is 14% between 29 and 32 weeks, and 3.5% at term. Anticipatory guidance regarding plan for version as well as plans for persistent breech should be reviewed with the patient.

151. b. serum creatinine > 1.1 mg/dL.

Preeclampsia is the development of blood pressure higher than or equal to 140/90 mm Hg on two occasions at least 4 hours apart after 20 weeks of gestation, and proteinuria greater than or equal to 300 mg per 24-hour urine collection or protein/creatinine ratio greater than or equal to 0.3 or, if other quantitative methods are unavailable, a dipstick result of 1+. In the absence of proteinuria, diagnosis parameters for preeclampsia include new-onset hypertension with any of the following:
• Thrombocytopenia: platelet count < 100,000/microliter
• Renal insufficiency: serum creatinine > 1.1 mg/dL or doubling of serum creatinine concentration without renal disease
• Impaired liver function: doubling of normal levels of liver transaminases
• Pulmonary edema
• Cerebral or visual symptoms


Bibliography
Chapter 7 Prenatal Care and Fetal Assessment


Initial Assessment

• Reason for visit (chief complaint or concern)
• Sociodemographics/social determinants

1. Age—opposite ends of the age spectrum create risks
   a. Adolescents
      (1) Prone to late entry to care and poor compliance with prenatal care schedule
      (2) At risk for low birthweight and prematurity
      (3) Increased risk for
         (a) Hypertensive disorders of pregnancy
         (b) Premature labor
         (c) Preterm birth
         (d) Intrauterine growth restriction (IUGR)
         (e) Infant mortality
      (4) Risk probably multifactorial with associated social determinants
         (a) Parity
         (b) Race
         (c) Marital status
         (d) Educational level
         (e) Socioeconomic status
   b. Advanced maternal age for pregnancy is older than age 35 years
      (1) Higher incidence of infertility and first-trimester spontaneous abortion and ectopic pregnancy
      (2) Proportional increase in rates of genetic abnormalities with advancing age
      (3) Increased rates of complications including
         (a) Hypertensive disorders of pregnancy
         (b) Preterm delivery
         (c) Gestational diabetes
         (d) Dysfunctional labor leading to cesarean birth
         (e) Relationship to underlying disease processes
         (f) Placenta previa and abortion

2. Race/ethnicity
   a. Increased rate of low-birthweight babies born to African American women
   b. Certain genetic disorders are increased within specific ethnic groups

3. Social determinants
   a. Lower socioeconomic status directly proportional to poor obstetric outcome, including premature labor and delivery
   b. Can be related to limited access to prenatal care and necessary resources such as whether one lives in a food-desert area or in an area with ample resources

• Gravidity and parity

1. Length of labor
   a. Nullipara average longer labors
   b. Multipara average shorter labors
   c. Grand multiparous women (parity > 5) can have prolonged dysfunctional labors

2. Obstetric complications
   a. Increased parity associated with increased rates of
      (1) Abruptio placenta
      (2) Placenta previa
      (3) Multifetal pregnancy
      (4) Postpartum hemorrhage (PPH)
   b. Grand multiparity can contribute to abnormal presentation, including transverse lie

• Estimated gestational age (EGA)—based on determination of estimated date of delivery (EDD); synonymous terms for EDD include estimated date of birth (EDB) and estimated date of confinement (EDC); latter term traditionally used but less frequently because of negative connotations of the word confinement

1. Menstrual dating (using Naegele's rule)—add seven days to the first day of the last menstrual period and subtract three months
2. Ultrasound dating—most accurate if performed in the first trimester
3. Anatomic dating by fundal height measurement
• Review of the antepartum course—preferably using prenatal chart
  1. History of prenatal visits
     a. Timing of first visit
     b. Compliance with visit schedule
     c. Unscheduled visits/consults
  2. Weight gain
     a. Prepregnancy weight/body mass index (BMI)
     b. Appropriateness of interval weight gain
     c. Total weight gain
  3. Blood pressure
     a. Initial blood pressure
     b. Changes in blood pressure values throughout pregnancy
  4. Fundal height growth
  5. Ultrasound results
  6. Current medications
  7. Obstetric complications/unscheduled visits

• Laboratory data
  1. Blood type and Rh factor
  2. Hemoglobin/hematocrit
  3. Hepatitis B surface antigen status
  4. Rubella status
  5. Pap test result
  6. Sexually transmitted infection (STI) screening results (including HIV, RPR)
  7. Glucose screening
  8. Group B streptococcus culture
  9. Genetic testing results
     a. Chorionic villus sampling
     b. Amniocentesis
     c. Multiple marker screening (quad or penta)
     d. Nuchal translucency combined with human chorionic gonadotropin (hCG) and pregnancy-associated plasma protein-A (PAPP-A) levels
     e. Cell-free fetal DNA

• Family history
  1. Obstetric complications
  2. Genetic diseases, including chromosomal abnormalities and ethnicity-based disorders
  3. Congenital defects or syndromes
  4. Medical disorders
     a. Hypertension (HTN)
     b. Diabetes
     c. Cardiac disease
     d. Asthma
        (1) Level of severity
        (2) History of hospitalization, intubation, or use of oral steroids
  5. Obstetric history
     1. Gravidity—total number of pregnancies
     2. Parity—outcome of previous pregnancies
        a. Expressed as a four-digit number (TPAL)

b. First digit is number of full-term infants (T); second digit is number of preterm infants (P); third digit is number of abortions (spontaneous/elective) (A); fourth digit is number of living children (L)

3. Description of previous pregnancies
   a. Duration of gestation
   b. Birthweight
   c. Duration of labor
   d. Type of delivery
   e. Analgesia/anesthesia
   f. Complications of the antepartum, intrapartum, or postpartum period
   g. Place of delivery
   h. Provider

• Past medical history
  1. Allergies
  2. Medical conditions
  3. Previous surgeries
  4. Medication (over-the-counter and prescription) and herb/supplement use

• Review of systems
  1. Genitourinary
  2. Respiratory
  3. Cardiovascular
  4. Gastrointestinal
  5. Neurologic
  6. Musculoskeletal

• Labor status
  1. Onset of contractions
  2. Description of contractions
     a. Frequency
     b. Duration
     c. Intensity
  3. Status of membranes
     a. Time of rupture
     b. Amount
     c. Color
  4. Frequency of fetal movements
  5. Presence or absence of bloody show
  6. Other subjective symptoms
     a. Nausea and vomiting
     b. Rectal pressure

Physical Examination

• Vital signs
• Abdominal examination
  1. Leopold’s maneuvers for fetal presentation and position during labor
     a. Determination of attitude is more difficult secondary to fetal descent
     b. Location of fetal back provides best determination of fetal position without pelvic examination
2. Palpation of contraction intensity
3. Presence of fetal movement
4. Location of fetal heart tones

- Pelvic examination
  1. External perineal inspection
     a. Presence of bloody show
     b. Presence of amniotic fluid
     c. Presence of lesions
  2. Internal examination
     a. Sterile speculum examination—before digital examination if ruptured membranes are suspected, frank bleeding is present, or inspection for herpetic lesions is necessary
     b. Digital examination
        (1) Dilation
        (2) Effacement
        (3) Station—relationship of the leading edge of the fetal presenting part to the ischial spines (in centimeters)
           (a) 0 station—the presenting part is at the level of the spines
           (b) –3, –2, –1 station—number of centimeters of the presenting part above the level of the ischial spines
           (c) +1, +2, +3 station—number of centimeters of the presenting part below the level of the ischial spines
     (4) Presenting part—the anatomic part of the fetus that first descends into the pelvis
     (5) Position—relationship between the denominator of the presenting part and the maternal pelvis
        (a) Cephalic presentation—the denominator is the occiput
        (b) Breech presentation—the denominator is the sacrum
        (c) Shoulder presentation—the denominator is the scapula
        (d) Face presentation—the denominator is the mentum
     (6) Status of membranes
     (7) Clinical pelvimetry—determination of adequacy of bony pelvis
        (a) The pelvis is composed of four bones
           i. Two innominate
           ii. Sacrum
           iii. Coccyx
        (b) Symphysis pubis joins the two innominate (pubic) bones anteriorly
        (c) True pelvis defines the birth canal
           i. Inlet boundaries are at the level of the sacral promontory (posteriorly), the linea terminalis (laterally), and the upper margins of the pubic bones (anteriorly)
           ii. Midplane of the pelvis is known as “the plane of least dimensions” and the boundaries are the sacrum at the junction of the fourth and fifth sacral vertebrae (posteriorly), the ischial spines (laterally), and the inferior border of the symphysis pubis (anteriorly)
           iii. Outlet boundaries are the sacrococcygeal joint (posteriorly), the inner surface of the ischial tuberosities (laterally), and the lower border of the symphysis pubis (anteriorly)

(d) Classification of pelvic types
   i. Gynecoid
      a) Round shaped pelvis
      b) Transverse diameter only slightly longer than anteroposterior
      c) Incidence—50% of white women
      d) Excellent prognosis for vaginal birth
   ii. Android
      a) Heart-shaped or triangular-shaped pelvis
      b) Posterior pelvis wider than anterior
      c) Poor prognosis for vaginal birth requiring operative delivery or C-section
   iii. Anthropoid
      a) Oval-shaped pelvis
      b) Anteroposterior diameter is longer than transverse diameter
      c) Incidence—40.5% of nonwhite
      d) Good prognosis of vaginal birth—higher incidence of occiput posterior position
   iv. Platypelloid
      a) Flattened gynecoid shape pelvis
      b) Wide transverse diameter with very short anteroposterior diameter
      c) Incidence—3%
      d) Poor prognosis for vaginal birth

- Fetal heart rate assessment
  1. Continuous—by external electronic fetal monitor
     a. Determination of the fetal heart rate
     b. Assessment of variability
     c. Determine presence or absence of periodic changes, including decelerations, tachycardia, or bradycardia
  2. Continuous—by internal monitoring via fetal scalp electrode
     a. Measures the actual R-to-R interval of the fetal QRS complex; more accurate surveillance
     b. Increased risk of infection with internal monitoring; most frequently used if unable to obtain clear tracing with external monitor
  3. Intermittent by Doppler
     a. Auscultation of fetal heart rate at prescribed intervals based on stage of labor to assess fetal tolerance of labor
     b. Unable to determine variability or isolated decelerations

4. Fetal heart rate tracings classification (Macones et al., 2008)
   a. Category I: Normal; no action required
   b. Category II: Indeterminate; require continued evaluation and close monitoring
   c. Category III: Associated with abnormal fetal acid–base status; prompt action required

- Head-to-toe examination
  1. General affect and coping abilities
  2. Head, eyes, ears, nose, and throat
     a. Absence of facial edema
     b. Absence of upper respiratory infection (URI) signs
  3. Heart and lungs
     a. Heart sounds without murmurs, rubs, or gallops—may have split S1, I-II/VI systolic murmur, audible S3
     b. Lungs clear to auscultation
1. Clients can be encouraged to ambulate to help labor progress and
to increase coping abilities
2. Factors to consider in decision making
   a. Unstable lie or malpresentation
   b. Need for increased fetal surveillance and monitoring
   c. Birth facility policy
3. Can consider gastrointestinal protective agents such as
   magnesium/aluminum hydroxide, calcium carbonate/magnesium
   hydroxide, and sodium citrate/citric acid combinations

- Limitations of activity level
  1. Clients can be encouraged to ambulate to help labor progress and
to increase coping abilities
  2. Factors to consider in decision making
     a. Unstable lie or malpresentation
     b. Need for increased fetal surveillance and monitoring
     c. Birth facility policy

- Pain management/coping during labor and delivery
  1. Nonpharmacologic methods
     a. Can allow the woman to feel more in control of the birth
        process
     b. Can be used without significant risk of side effects—especially
        helpful in latent labor
        (1) Ambulation and movement; use of birthing ball
        (2) Hydrotherapy
        (3) Breathing and relaxation/hypnotherapy
        (4) Music
        (5) Position changes
        (6) Acupuncture/acupressure
        (7) Sterile water injections
        (8) Touch and massage; warm compresses such as a heating
           pad or rice sock
        (9) Aromatherapy
  2. Analgesia
     a. Used to ameliorate the pain sensation; may change and alter
        consciousness; some medications have amnesiac effect
     b. Can be used in latent and active phase
Mechanisms of Labor

1. Power of contractile efforts
   a. Adequacy of strength
   b. Assess need for augmentation of labor

2. Passenger
   a. Lie
   b. Presentation
   c. Position
   d. Size
   e. Synclitism versus asynclitism
      (1) The relationship of the sagittal suture line to the maternal sacrum and symphysis pubis
      (2) Synclitism denotes the sagittal suture is midway between these two bones; biparietal diameter is parallel to the planes of the pelvis
      (3) Asynclitism denotes that the sagittal suture is oriented toward the pubis or the sacrum
         a. Posterior asynclitism—the sagittal suture is closer to the symphysis pubis
         b. Anterior asynclitism—the sagittal suture is closer to the sacrum
         c. Can be the cause of labor dystocia
         d. Lax abdominal musculature contributes to asynclitism

3. Passageway
   a. Clinical pelvimetry
   b. Classification of the pelvic structure

4. Psyche
   a. Woman's view of labor/birth and her ability to handle it
   b. Appropriateness of emotional support
   c. Education or preparation of labor
   d. Meaning of the pregnancy
   e. Ability to achieve birth plan
   f. History of sexual abuse

• The 4 Ps of labor (power of contractile efforts, passenger, passageway, psyche)

1. Power of contractile efforts
   a. Adequacy of strength
   b. Assess need for augmentation of labor

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• Labor assessment and progress

1. Stages of labor—Friedman's concepts presented, but more recent research conflicts with some of Friedman's findings (as indicated below) (Friedman, 1972)
   a. First stage—from onset of regular contractions through full dilatation (10 cm)
      (1) Latent labor—from onset of labor until 4–6 cm
         (a) Contraction pattern
            i. Every 10–20 minutes lasting 15–20 seconds to every 5–7 minutes lasting 30–40 seconds
            ii. Mild to moderate intensity
      (b) Length
         i. Nullipara should be 20 hours or less
         ii. Per Friedman curve (Friedman, 1972), multipara should be 14 hours or less
      (2) Active labor—from 4–6 to 10 cm, begins with the acceleration phase that does not occur until 5–6 cm dilatation in most women. Recent research findings (Zhang et al., 2010) also suggest that there is not a normally occurring deceleration phase (as previously described by Friedman (1972)) in active labor just before complete dilatation
         (a) Contraction pattern
            i. Become more frequent, regular, and intense
            ii. In active labor, typically every two to three minutes lasting at least 60 seconds,
            iii. Moderate to strong by palpation
         (b) Length
            i. Nullipara
            ii. Multipara
         (c) Strength of contractions
            i. Externally measured by palpation
            ii. Internally
               a) By intrauterine pressure catheter (IUPC)
               b) Adequacy in active phase is considered 200–250 Montevideo (mVu) units in 10 minutes averaged over 30-minute period
         (d) Descent
            i. Nullipara
            ii. Multipara
   b. Second stage of labor—from full dilatation until the birth of the baby; pushing or expulsive phase

2. Abnormal labor progress—according to Friedman (1972)
   a. Abnormal latent phase
      (1) Nullipara, more than 20 hours
      (2) Multipara, more than 14 hours
   b. Abnormal active phase
      (1) Nullipara progress, less than 1.2 cm/hour (Friedman, 1972)
      (2) Multipara progress, less than 1.5 cm/hour (Friedman, 1972)
      (3) Less than 200–250 mVu in 10 minutes by IUPC
      (4) Zhang’s findings—Zhang et al. (2010) used modern statistical interval measure techniques to analyze more than 54,000 births and demonstrated a hyperbolic, not a linear or sigmoidal, labor curve, with dilatation occurring more rapidly with advanced labor and without a deceleration phase (as previously described by Friedman, 1972)

   c. Descent
      (1) Nullipara
         (a) Less than 1 cm/hour (Friedman, 1972)
         (b) Less than three hours without an epidural, less than four hours with an epidural (Spong et al., 2012)
      (2) Multipara
         (a) Less than 2.1 cm/hour (Friedman, 1972)
         (b) Less than two hours without an epidural, less than three hours with an epidural (Spong et al., 2012)

Management of the First Stage of Labor

• Assessment of maternal status

1. Psychological status of client
   a. Perception of pain/coping
   b. Coping ability and coping strategies
   c. Presence and support of people
   d. Client's perception of need for admission to the birthing facility

2. Physical status of the client
   a. Vital signs
      (1) Temperature
         (a) Slightly elevated (< 100°F) during labor, highest in the time preceding and immediately following the birth
         (b) Epidural anesthesia can artificially elevate temperature
      (2) Blood pressure
         (a) Systolic blood pressure increases 10–20 mm Hg during contractions
         (b) Diastolic blood pressure increases 5–10 mm Hg during contractions
         (c) Blood pressure returns to prelabor levels between contractions
         (d) Pain and fear can contribute to elevations in blood pressure
      (3) Pulse
         (a) Because of the increased metabolic rate during labor, pulse rate is slightly elevated
         (b) Inversely proportional to action of the contraction; increases during increment and decreases at acme
         (c) For this reason, if fetus having recurrent accelerations during contractions, important to place pulse oximeter to distinguish fetal heart rate (FHR) from maternal pulse
      (4) Respiration
         (a) Slightly increased rate during labor
         (b) Hyperventilation is common and related to pain response and can lead to alkalosis

• Assessment of labor progress

1. Vaginal examinations
   a. Allows assessment of labor progress related to cervical dilatation and/or fetal descent
   b. Frequency of vaginal examinations depends on phase of labor, provider choice, client's wishes, and status of membranes
Management of the First Stage of Labor

2. Partographs—graph of labor curve
   a. Designed by Dr. Emmanuel Friedman (1972) to chart labor progress to ensure adequacy
   b. Expectation of standard progress of labor by Friedman’s formula not universally accepted
   c. Research by Philpott and Castle (1972) suggests that aggressive management interventions (such as oxytocin augmentation) should not be initiated unless dilatation averages less than 0.56–0.64 cm/hour in active labor. Recent evidence on the normal progress of the first stage of labor (Zhang et al., 2010) supports the use of an individualized approach

• Pain management
  1. Basis of labor pain
     a. Physiologic
        (1) Intensity of contractions
        (2) Degree of cervical dilatation
        (3) Descent of fetus causing pressure on pelvic structures
        (4) Fetal size
        (5) Fetal position
        (6) Hypoxia of uterine muscle cells during action of contractions
     b. Psychological
        (1) Fear
        (2) Anxiety
        (3) Lack of knowledge regarding labor process
        (4) Lack of support
        (5) Cultural influences
  2. Negative physiologic responses related to labor pain
     a. Hyperventilation
     b. Stress responses—related psychological effect causes increased cortisol and decreased placental perfusion
     c. Increased cardiac output and blood pressure
  3. Factors influencing pain management decisions
     a. Patient choice or birth plan
     b. Stage of labor
     c. Fetal status
     d. Other factors contributing to pain response
     e. Possible routes of medication administration
     f. Availability of pain medication modalities
     g. Nursing staff availability
  4. Pain management methods
     a. Nonpharmacologic pain relief
        (1) Relaxation and breathing techniques
        (2) Hydrotherapy—tub, shower, Jacuzzi
        (3) Position changes; ambulation
        (4) Massage
        (5) Environmental measures (i.e., quiet surroundings, aromatherapy, music)
        (6) Acupuncture/acupressure
        (7) Hypnosis
     b. Pharmacologic pain relief
        (1) Opioid analgesics given in labor but should be avoided with active labor

(a) Morphine sulfate for prodromal labor 10–15 mg IM
(b) Fentanyl 50–100 micrograms IV or IM
(c) Meperidine 50–75 mg IM or 25–50 mg IV—rarely used in current practice because the metabolite normeperidine accumulates in the fetus and potentiates depressant effects on the newborn

(2) Mixed agonist-antagonist opioid analgesics
   a. Butorphanol 1–2 mg IV or 2 mg IM
   b. Nalbuphine 10–20 mg IM or 5 mg IV

• Assessment and evaluation of fetal well-being
  1. Physiology of FHR regulation
     a. Parasympathetic/sympathetic nervous system—responsible for the variability of the FHR
     b. Baroreceptors
        (1) Increased pressures can cause vagal response in the fetus
        (2) Located in the carotid arteries
     c. Chemoreceptors
        (1) Located in the aortic arch and carotid sinus
        (2) Sensitive to changes in the fetal pH, O₂ level, and CO₂ level and respond by increasing fetal blood pressure and heart rate
     d. Sympathetic nervous system activation increases the baseline FHR
     e. Parasympathetic nervous system activation decreases the baseline FHR (Gabbe et al., 2017)
  2. Evaluation of the FHR in labor
     a. Baseline
        (1) Normal range for a fetus at term 110–160 beats per minute (bpm)
        (2) FHR between 110 and 120 bpm can be normal at term with appropriate variability
        (3) Judged over approximately 10 minutes, the mean FHR in the absence of periodic changes rounded to the nearest five beats should be documented
     b. Bradycardia
        (1) FHR at less than 110 bpm for 10 or more minutes
        (2) Marked bradycardia is less than 100 bpm for 10 or more minutes
           a. Causes
              i. Cord compression
              ii. Rapid descent
              iii. Vagal stimulation
              iv. Medications
              v. Anesthesia or medications
              vi. Placental insufficiency
              vii. Fetal cardiac anomalies
              viii. Terminal condition of the fetus
c. Tachycardia
   (1) FHR of more than 160 bpm for more than 10 minutes
      (a) Causes
         i. Maternal fever
         ii. Infection
         iii. Medications, especially beta sympathomimetics
         iv. Chronic fetal hypoxia
         v. Can be compensatory after temporary fetal hypoxia event
         vi. Undiagnosed prematurity
         vii. Excessive fetal movement

d. Variability
   (1) Combination of influences between the sympathetic and parasympathetic nervous systems
   (2) Baseline variability—fluctuations in the baseline of the FHR
      (a) Absent—undetectable amplitude
      (b) Minimal—amplitude range ≤ 5 bpm
      (c) Moderate—amplitude range 6–25 bpm
      (d) Marked—amplitude ≥ 25 bpm

e. Accelerations—sign of fetal well-being; cannot be produced by acidic fetus (indicates fetal pH of more than 7.20)
   (1) Greater than 32 weeks—a peak of ≥ 15 bpm above the baseline lasting ≥ 15 seconds but less than 2 minutes from beginning to end of acceleration
   (2) ≤ 32 weeks—a peak of ≥ 10 bpm above the baseline lasting ≥ 10 seconds but less than 2 minutes from beginning to end of acceleration

f. Periodic changes
   (1) Variable decelerations
      (a) Abrupt (onset to nadir < 30 seconds) periodic or non-periodic decrease in the FHR that differs in shape from one deceleration to another. The decrease in FHR from the baseline is ≥ 15 bpm lasting ≥ 15 seconds but less than 2 minutes
      (b) FHR deceleration does not reflect the shape of the contraction
      (c) Can occur at any time in relation to the contractions
      (d) Nonconsistent shape; can look like a U, V, or W
      (e) Generally with an abrupt drop below the FHR baseline and a rapid return to baseline
      (f) Generally caused by cord compression
      (g) Implications
         i. With rapid recovery to baseline and good variability, generally considered an uncompromised fetus
         ii. Suspect fetal compromise with slow recovery to baseline, increasing length or depth of decelerations, absent variability, or increasing frequency of decelerations
   (h) Management
      i. Position change
      ii. IV fluid bolus
      iii. O₂ at 10 liters per minute (LPM) via face mask
      iv. Pelvic examination, to rule out cord prolapse
      v. Contact consulting physician if warranted
      vi. Consider amnioinfusion
   (2) Early decelerations
      (a) Uniformly shaped slowing of the FHR that mirrors the contractions
      (b) Gradual descent to the nadir (≥ 30 seconds) with gradual return

(c) FHR usually remains within the normal range and deceleration usually less than 90 seconds
(d) Deceleration begins, peaks, and ends with the contraction
(e) Generally caused by head compression, vagal stimulation
(f) Generally considered a benign pattern
(g) Management
   i. Surveillance
(3) Late decelerations
   (a) Uniformly shaped gradual (≥ 30 seconds) slowing of the FHR that begins with the peak of the contraction and does not return to baseline until after the completion of the contraction
   (b) FHR may or may not remain within the normal fetal heart range
   (c) Can occur in an isolated fashion but more ominous when occurs repetitively
   (d) Possible causes
      i. Uteroplacental insufficiency
      ii. Fetal hypoxia
      iii. Uterine tachysystole
      iv. Decreased placental blood flow
      v. Maternal hypotension
      vi. Abruptio placenta
      vii. Medication effect
   (e) Management
      i. Left lateral position
      ii. IV fluid bolus
      iii. O₂ at 10 LPM
      iv. Attempt to correct underlying cause
      v. Consult with physician

3. Fetal monitoring techniques
   a. All women require some method of fetal monitoring in labor
   b. Modality is based on maternal/fetal risk status, birth site, and client desire
   c. For low-risk women, intermittent auscultation is equivalent to continuous fetal monitoring to detect fetal compromise
   d. FHR monitoring techniques
      (1) Intermittent FHR auscultation by fetoscope or Doppler
         (a) Should be considered for low-risk pregnancies
         (b) Frequency of auscultation—depends also on facility protocol
            i. Auscultate for 60 seconds after a contraction every 30 minutes in the first stage of labor if low risk; every 15 minutes if high risk
            ii. Every 15 minutes during the second stage of labor if low risk; every 5 minutes if high risk
      (2) Continuous fetal monitoring
         (a) Recommended for high-risk pregnancies or when intermittent monitoring is not indicated
         (b) Frequency of FHR tracing review
            i. Every 15 minutes in the first stage
            ii. Every 5 minutes in the second stage
         (c) Modalities for continuous fetal monitoring
            i. External FHR—ultrasound detection and tracing of the FHR through the abdominal wall
            ii. Internal FHR
               a) Via fetal scalp electrodes (FSEs)
Fetal heart rate tracing classifications

1. Category I—normal tracing, associated with normal acid–base balance
   a. Normal baseline
   b. Moderate FHR variability
   c. Absent late or variable decelerations
   d. Present or absent early decelerations
   e. Present or absent accelerations

2. Category II—indeterminate tracing, not predictive of fetal acid–base status, require continued monitoring and evaluation
   a. Baseline rate of either bradycardia or tachycardia
   b. Minimal, absent with no recurrent decelerations, or marked variability
   c. No accelerations despite fetal stimulation
   d. Recurrent variable decelerations with minimal or moderate baseline variability
   e. Prolonged decelerations between 2 and 10 minutes
   f. Recurrent late decelerations with moderate baseline variability
   g. Variable decelerations that have “overshoots” or “shoulders”

3. Category III—abnormal tracings, associated with abnormal fetal acid–base status; prompt corrective action required; characterized by absent FHR variability in conjunction with any of the following:
   a. Bradycardia
   b. Recurrent variable decelerations
   c. Recurrent late decelerations
   d. Sinusoidal pattern
   e. Direct fetal testing
      (1) Fetal scalp stimulation
         a) During vaginal examination, fetal head is stimulated
         b) Expected result should be FHR acceleration of more than 15 beats off baseline for more than 15 seconds
         c) Expected result correlates to fetal pH of more than 7.20
         d) Cannot be reliably performed during deceleration or bradycardia; must wait for FHR recovery
         e) Validity and reliability not well established

4. External uterine monitoring
   a. Tocodynameter—senses the changes in pressures against the strain gauge resulting from the change in abdominal wall contour
      (1) Records contraction interval and duration
      (2) Cannot determine intensity of contractions
   b. Palpation

5. IUPC—can accurately measure the intensity of contractions in mm Hg so that adequacy of contractions can be calculated in Montevideo units

Fetal positions during birthing process

1. Mechanisms of labor and cardinal movements based on occiput anterior (OA) position
   a. Left occiput anterior (LOA) is the most common position of birth
   b. Position and appropriate cardinal movements are facilitated in the gynecoid pelvis

   c. Cardinal movements of labor
      (1) Descent—usually in the left occiput transverse (LOT) position if engagement occurs during labor with rotation to LOA
      (2) Flexion—vertex begins partially flexed; is completely flexed when reaches pelvic floor, changing presenting diameter to suboccipitobregmatic of 9.5 cm
      (3) Internal rotation—rotation of 45 degrees to OA allows the head to maximize the anterior-posterior (AP) diameter of the gynecoid pelvis
      (4) Extension—fulcrum of the neck under the symphysis pubis allows birth of the head
      (5) Restitution—vertex rotates 45 degrees as the shoulders begin entering the AP diameter
      (6) External rotation—as head rotates another 45 degrees, shoulders complete the remainder of the rotation to allow delivery in direct AP diameter

   2. Mechanisms of labor and cardinal movements with occiput posterior (OP) position
      a. Incidence of OP presentation is 15–30%
      b. Right occiput posterior (ROP) is five times more common than left occiput posterior
      c. More common in android pelvis and anthropoid pelvis
      d. Ninety percent of OP presentations rotate to OA via long arc rotation of 135 degrees (ROP to ROT to ROA to OA)
      e. Short arc rotation of 45 degrees results in direct OP (or deep transverse pelvic arrest if failure to rotate completely)
      f. Cardinal movements for persistent OP position (short arc rotation)
         (1) Descent—head enters pelvis at an oblique angle (more often ROP than LOP)
         (2) Flexion presents smaller diameter through pelvis
         (3) Internal rotation—head rotates 45 degrees to OP position
         (4) Flexion/extension—once rotation is complete; birth of the head occurs by movements of flexion until the sinciput impinges beneath the symphysis pubis and then the remainder of the head is born by extension
         (5) Restitution—fetal head rotates 45 degrees to either ROP or LOP position
         (6) External rotation—head rotates another 45 degrees as shoulders complete remainder of rotation to the anterior-posterior diameter of the outlet to facilitate birth

   Emotional support

   1. Psychological
      a. Calm environment
      b. Perception of safety and support for mother and baby
      c. Maintenance of privacy and modesty
      d. Participation in the plan of care

   2. Role of the labor support person
      a. Reinforcement of and positive encouragement for the laboring woman
         b. Participation in the birth process
            (1) Providing oral fluids and/or ice chips
            (2) Encouraging position changes
            (3) Relaxation techniques
            (4) Massage
            (5) Coaching with breathing techniques
Management of the Second Stage of Labor

• Begins with complete dilatation and ends with the birth of the infant

• Maternal status

1. Vital signs
   a. Blood pressure (BP)—every 5–15 minutes
      (1) BP must be taken between contractions
      (2) BP can be elevated 10 mm Hg in the second stage of labor because of pushing effort
   b. Pulse and respiratory rate every 5–15 minutes
   c. Temperature every two hours if membranes intact; every one hour if membranes ruptured

2. Hydration and fluid status
   a. IV or oral fluids should be encouraged because of
      (1) Increased metabolism
      (2) Increased respiratory efforts/hyperventilation of transition
      (3) Diaphoresis
      (4) Nausea and vomiting
   b. Bladder status
      (1) Bladder distention can compromise pelvic capacity
      (2) Inability to void may require catheterization
      (3) Prevent problem by having client void (or catheterize) when full dilatation approaches

3. Behaviors and coping ability
   a. Assessment of maternal fatigue
   b. Coping ability
   c. Response to pain and pressure

4. Pain control
   a. Evaluate level of sensation in epiduralized client to determine whether anesthetic level is hindering pushing efforts
   b. Pudendal anesthesia is occasionally used in client without epidural as fetal descent occurs, causing perineal distention and pain

5. Expulsive effort
   a. Client should be coached to achieve effective pushing effort
   b. Allow women with an epidural a resting period of passive descent or “laboring down” before active pushing
   c. Types of pushing
      (1) Open glottis physiologic pushing
      (2) Closed glottis Valsalva pushing—can decrease cardiac output and blood flow to the uterus; associated with more FHR decelerations and a higher incidence of perineal trauma
   d. Client should be instructed to pant at the time of crowning: “control the mother, not the head”

6. Integrity of the perineum
   a. Maternal preference is generally avoidance of episiotomy
   b. Indications for episiotomy
      (1) Need to expedite birth secondary to fetal bradycardia
      (2) Anticipation of shoulder dystocia
      (3) Operative birth
      (4) Short perineum

• Fetal status

1. Vaginal examination
   a. Evaluation of descent with pushing effort
   b. Normalcy of fetal position and adaptation to the maternal pelvis
      (1) Molding/caput succedaneum
      (2) Synclitism versus asynclitism
      (3) Appropriate rotation to facilitate delivery

2. FHR monitoring
   a. Need for increased frequency of FHR evaluation
      (1) Evaluation at least every 15 minutes
      (2) More commonly every five minutes or after each contraction
   b. Periodic changes (early and variable decelerations) in FHR common
      (1) Decelerations secondary to head compressions

• Pain relief

1. Breathing techniques
   a. Controlled breathing as contraction begins and ends assists in focusing efforts
   b. Promote relaxation between pushing efforts

2. Opioid analgesia
   a. Should not be given within one hour of birth
   b. Can cause respiratory depression in the neonate

3. Regional anesthesia
   a. Effectively lessens the pain and pressure sensations of the second stage
   b. Can lengthen second stage secondary to pelvic musculature relaxation and decreased pressure sensations
   c. Pudendal—lidocaine 1% up to 10 cc on each side
      (1) Provides dense nerve block to the perineum
      (2) Does not inhibit pushing efforts
      (3) Needs to be timed well for best anesthetic effect
         (a) Primiparas when vertex is at +2
         (b) Multiparas shortly before complete dilatation

4. Local anesthesia
   a. Perineal infiltration—lidocaine 1−2% usually 10 cc in divided dosing (up to 30 cc maximum of 1% solution)
      (1) Used before cutting of an episiotomy
      (2) For repair of episiotomy or laceration(s)

• Emotional support

1. Encouragement

2. Participation of labor support persons

3. Adherence to birth plan

• Cardinal movements of labor

1. Eight basic movements that take place to allow birth in vertex presentation
   a. Engagement—biparietal diameter of fetal head passes through pelvic inlet
   b. Descent—occurs secondary to forces of uterine contractions; change in the tone of pelvic musculature and maternal pushing
   c. Flexion—occurs when the fetal head meets the resistance of the pelvic floor during descent and forces the smaller suboccipito-bregmatic diameter to enter the pelvis first
d. Internal rotation—causes the fetal head to rotate to the antero-posterior diameter of the maternal pelvis, most commonly causing the occiput to rotate to the anterior portion of the pelvis.
e. Extension—mechanism by which the birth of the fetal head occurs; the fetal head follows the curve of Carus; the suboccipital region of the fetal head pivots under the maternal pubic symphysis.
f. Restitution—rotation of the head 45 degrees and realignment to the shoulders.
g. External rotation—occurs as the shoulders rotate 45 degrees, bringing the shoulders into the anteroposterior diameter of the pelvis; the head also rotates another 45 degrees.
h. Birth of the body occurs by lateral flexion of the shoulders via the curve of Carus.

**Delivery Management**

- Maintenance of pelvic integrity

1. Anatomy
   a. Pelvic floor musculature
      (1) Function to support pelvic organs
      (2) Aids in the anterior rotation of the fetus during pelvic descent and birth
      (3) Consists of two muscle groups
         i. Pubococcygeus, made up of:
            a) Pubovaginalis
            b) Puborectalis
            c) Pubococcygeus proper
         ii. Iliococcygeus
      (b) Coccygeus
   b. Perineal musculature
      (1) Perineum is divided into two triangles and is more superficial than the pelvic floor musculature
         (a) Anteriorly as the urogenital triangle
            i. Superficial transverse perineal muscle
            ii. Ischiocavernosus muscle
            iii. Bulbocavernosus
            iv. Deep transverse perineal muscle
         (b) Posteriorly as the anal triangle
            i. Sphincter ani externus
            ii. Anococcygeal body

2. Factors interfering with perineal integrity
   a. Size of fetus
   b. Distensibility of perineum
   c. Control of expulsive efforts
   d. Operative delivery modalities (i.e., forceps or vacuum extraction)
   e. Occiput posterior position
   f. Use of lubricants
   g. Maternal position for birth
   h. Episiotomy (median or mediolateral)

3. Strategies to minimize perineal trauma
   a. Antepartum perineal massage
      (1) Begin at 36–37 weeks
      (2) Increases elasticity and maternal tolerance to perineal stretching
   b. External perineal massage from the time of perineal distension—of note, vigorous massage and stretching of the perineum in the second stage of labor has not been shown to be effective and may actually predispose the woman to an increased risk of lacerations
   c. Warm compresses during second stage
      (1) Increases circulation to perineum
      (2) Promotes elasticity
      (3) Assists in the relaxation of the musculature
   d. Lateral positioning for birth
   e. Counter pressure to maintain flexion of the fetal head during birth
   f. Education of the mother regarding the importance of controlled delivery of the head
   g. Support of the perineum at the time of birth (this is controversial; some providers adopt a hands-off approach to birth)

- Episiotomy—surgical incision performed to enlarge the vaginal opening to allow delivery of the fetal head

1. Anatomy
   a. Muscles cut during median episiotomy
      (1) Bulbocavernosus (sphincter vaginalis)
      (2) Ischiocavernosus
      (3) Superficial and deep transverse perineal muscles

2. Technique
   a. Median episiotomy
      (1) Place index and middle fingers, slightly separated and palm side down, in vagina
      (2) Insert scissors into the introitus in an up and down position with one blade placed externally and one blade placed internally
      (3) Depth of insertion should correspond to the length of intended episiotomy
      (4) Cut tissue in one motion deliberately and purposefully
      (5) Evaluate adequacy of incision; repeat if indicated
   b. Mediolateral episiotomy—generally used if patient has a short perineum to avoid a laceration into the anal sphincter
      (1) Same procedure except that the direction of the scissors is a 45-degree angle from the base of the introitus directed either right or left
      (2) The angle of the incision should be aimed toward the corresponding ischial tuberosity
      (3) Much more difficult to repair

3. Lacerations
   a. First degree—involves the vaginal mucosa, posterior fourchette, and perineal skin
   b. Second degree—involves same structures as above plus perineal muscles
   c. Third degree—involves same structures as second degree plus tearing through the entire thickness of the rectal sphincter
   d. Fourth degree—involves all the structures as above plus tearing of the rectal mucosa

4. Repair
   a. Fundamentals of repair
      (1) Use of aseptic technique
      (2) Adequate anesthesia
Visiblity through good hemostasis
4. Appropriate suture material including needle size
5. Minimize local tissue trauma through gentle and limited blotting
6. Minimize the amount of suture used
7. Good approximation of tissues decreasing dead space
b. Suture material
1. Vicryl is the most common suture material
2. Chromic catgut is alternately used for repair
3. Suture gauge
   a. 3-0
      i. Vaginal mucosa
      ii. Subcutaneous tissue
      iii. Subcuticular tissue
   b. 4-0 for finer repairs
      i. Periurethral
      ii. Periclitoral
      iii. Anterior wall of the rectum
   c. 2-0 for areas requiring more tensile strength
      i. Vaginal wall lacerations
      ii. Cervical lacerations
      iii. Deep interrupted sutures for repair of pelvic musculature
4. Needle selection
   a. Atraumatic general closure needles are preferable
   b. Small, fine GI needles should be used for fine stitching
   c. Cutting needles should not be used
b. Mechanisms of repair of median episiotomy or second-degree laceration
1. Inspection of tissues to assess depth and extent of laceration
2. Identify all appropriate anatomic structures
3. Begin repair approximately 1 cm beyond the apex of the laceration to the vaginal mucosa
4. Close the mucosa using continuous locked stitches to the level of the hymenal ring
5. Pass needle under hymenal ring and continue using blanket stitches (nonlocked) to the level of the bulbocavernous muscle
6. Repair bulbocavernous muscle with a crown stitch using a separate 2-0 suture if desired
7. If laceration is deep, consider several deep interrupted stitches using 2-0 suture
8. Using the 3-0 suture again, repair the subcutaneous layer with continuing stitching to the perineal apex
9. Using mattress stitches, perform subcuticular closure
10. At the level of the hymenal ring, bury the suture and tie off

• Management decisions for birth
1. Birth setting
   a. Hospital
   b. Birth center
   c. Home
2. Timing for the preparation of the birth related to location (i.e., setting up instrument table and donning personal protective equipment)
3. Delivery position for birth
   a. Semisitting
   b. Squatting
   c. Lateral
   d. Hands and knees
   e. Supine or lithotomy (least appropriate but commonly used)
4. Determine need for an episiotomy
5. Need for/type of additional anesthesia/analgesia
6. Use of perineal support during birth
7. Use of the Ritgen maneuver—assistance, if needed, in delivering fetal head by applying upward pressure to the fetal chin through the rectum during extension
8. Need for additional personnel (i.e., nurse, second midwife, consulting physician, pediatric provider)
9. Placement of newborn upon delivery
10. Timing of umbilical cord cutting

• Hand maneuvers for birth in the OA position
1. Apply counter pressure to the fetal head during crowning to maintain flexion and control extension using nondominant hand
2. If using perineal support, place thumb and index finger laterally on the distended perineum with palmar surface supporting perineal body
3. Control birth of head during extension
4. After birth of head, slide fingers of dominant hand around fetal head to posterior neck to feel for umbilical cord
5. If nuchal cord is present
   a. Gently slip over baby’s head if loose
   b. If not easily reduced over the head, slip cord over baby’s shoulders as the baby is born
   c. If tight
      (1) Somersault maneuver—direct baby to maternal thigh
      (2) Doubly clamp and cut and unwind cord before delivery of the shoulders (this is to be avoided)
6. Wipe fluid from the baby’s face, nose, and mouth with a soft cloth; routine suctioning with a bulb syringe is not necessary
7. After restitution and external rotation, place the palmar surface of each hand laterally on the baby’s head
8. With gentle downward traction, and maternal pushing effort, deliver anterior shoulder. Some recommend waiting for the next contraction
9. With upward traction, lift the baby’s head toward ceiling to deliver the posterior shoulder while observing the perineum
10. Glide posterior hand along head and posterior shoulder to control the posterior arm as it delivers
11. As the baby delivers, maintain posterior hand under the baby’s head with support by the wrist and forearm
12. The anterior hand follows the body of the baby during birth and grasps the lower leg of the baby
13. Rotate the baby into the football hold with the head in the palm and the legs between what was the posterior arm and attendant’s body
14. Keep the baby’s head below its hips, and slightly to the side, to facilitate drainage and suctioning
Management of the Third Stage of Labor

- Begins with delivery of the infant and ends with the delivery of the placenta
  1. Physiologic management versus
  2. Active management of the third stage of labor (AMTSL) shown to decrease risk of PPH in general population; three components of AMTSL per International Confederation of Midwives (ICM) and International Federation of Gynecology and Obstetrics (FIGO)
    a. Controlled cord traction (once pulsation stops)—World Health Organization (WHO) recommends this step only with skilled birth attendant, citing evidence of possible harm
    b. Use of a uterotonics agent (such as oxytocin)
    c. Fundal massage after delivery of the placenta
- Delivery of the placenta
  1. Timing—generally 5–30 minutes after the birth
  2. Method of placental separation
    a. Placenta separates from the uterine wall because of change in uterine size
    b. Hematoma forms behind the placenta along the uterine wall
    c. Separation of the placenta completes
    d. Descent of the placenta to the lower uterine segment or vagina
    e. Expulsion
  3. Signs and symptoms of placental separation
    a. Sudden increase in vaginal bleeding
    b. Lengthening of the umbilical cord
    c. Uterine change in shape from discoid to globular
    d. Uterus rises in the abdomen
  4. Mechanisms of placental delivery
    a. Schultz
      (1) Presents at the introitus with fetal side showing
      (2) More common than Duncan
      (3) Separation is thought to occur centrally first
      (4) Majority of bleeding is contained
    b. Duncan
      (1) Presents at the introitus with maternal side showing
      (2) Less common
      (3) Separation occurs initially at placental margin
      (4) Bleeding is more visible
      (5) Higher incidence of hemorrhage due to incomplete separation of placenta
  5. Management of placenta delivery
    a. Obtain cord bloods after clamping of the cord
    b. Inspect cord for number of vessels
    c. Guard the uterus while waiting for placenta separation
      (1) No fundal massage before separation
      (2) No traction on umbilical cord until separation
    d. Use modified Brandt-Andrews to assess for separation
    e. When separation has occurred, use Brandt-Andrews maneuver to stabilize the uterus and controlled cord traction to deliver the placenta
    f. May have mother push to assist expulsion
    g. Deliver placenta via the curve of Carus
   h. If membranes are trailing behind the placenta, carefully deliver membranes by:
      (1) Using a Kelly clamp or sponge stick clamp onto membranes; gently apply lateral and outward traction
      (2) Holding the bulk of the placenta and twisting the placenta over and over until the membranes are delivered
      (3) Inspecting placenta and membranes for completeness
- Appropriate diagnostic tests
  1. Cord blood
    a. Cord blood gases (arterial, venous)
    b. Fetal blood type and Rh
    c. Direct Coomb's testing
  2. Maternal blood
    a. Kleihauer–Betke test if mother is Rh negative
    b. CBC if hemorrhage suspected
- Use of uterotonics
  1. Oxytocin
    a. Used prophylactically against PPH
    b. Causes intermittent uterine contractions to decrease uterine size and the placental bed exposure
    c. Administration
      (1) Intravenous
        (a) Twenty to 40 units in 1,000 cc of IV fluid (normal saline or lactated Ringer's) with first liter running rapidly, second liter at 150 cc/hour
        (b) Can use up to 40 units per liter
        (c) Never give undiluted as a bolus injection
      (2) Intramuscular—10 units intramuscularly if no IV access
  2. Methylergonovine
    a. Causes a sustained, tetanic uterine contraction
    b. Can be used emergently as one-time dosing or as a series of doses for sustained effect
    c. Contraindicated in hypertensive patients because it causes peripheral vasoconstriction
    d. Administration
      (1) Intramuscular—0.2 mg IM, can be repeated once in five minutes; thereafter, every two to four hours
      (2) Oral
        (a) Generally given as a series of six doses over the first 24 hours postpartum
        (b) 0.2 mg orally every six hours
3. Misoprostol
   a. Administration: 600–1,000 micrograms per rectum is usual dose
   b. Side effects—shivering, fever, diarrhea, and abdominal pain possible
4. 15-methyl-F2alpha-prostaglandin (Hemabate)
   a. Used only in severe hemorrhage situations
   b. Administration
      (1) 250 micrograms
      (2) Can be given IM or intramyometrially
      (3) Contraindicated in women with asthma or with active cardiac, pulmonary, renal, or hepatic disease

• Placental abnormalities and variations
1. Battledore placenta—peripheral cord insertion, at placentation margin
2. Succenturiate lobe
   a. Most common abnormality—occurrence 3%
   b. Accessory placental lobe within the fetal sac that had continuous vascular connections with main placenta
   c. Can cause retained placenta or hemorrhage
3. Velamentous cord insertion
   a. Cord insertion into fetal sac, not directly into placental bed, generally 5–10 cm away from placenta
   b. Can cause shearing of blood vessels during labor or delivery of placenta, in turn causing hemorrhage
   c. More common in multiple gestations
4. Circumvallate placenta
   a. Opaque ring of fibrous–appearing tissue on fetal side of the placenta, caused by a double layer of chorion and amnion
   b. Can be seen in IUGR pregnancies but usually of no clinical significance

Management of Immediate Newborn Transition

• Apgar scoring
1. Devised in 1952 by Dr. Virginia Apgar to identify infants requiring assistance adapting to the extrauterine environment
2. Comparable to the biophysical profile scoring in utero
3. Significance of scoring
   a. One-minute Apgar scoring reflects initial stabilization
   b. Five-minute Apgar scoring has a relationship to neonatal morbidity and mortality
      (1) Apgars of less than 7 at 5 minutes indicate need for pediatric/neonatal involvement
      (2) Apgars of less than 4 at 5 minutes correlate with neonatal mortality
      (3) Low Apgar scores by themselves are not predictive of later neurologic dysfunction
   c. Not as valid an assessment for preterm infants
• Indications for pediatric/neonatal involvement
1. Any condition or circumstance that may compromise the adaptation of the neonate to extrauterine life
   a. Obstetric conditions

(1) Known IUGR
(2) Birth before 37 weeks
(3) Oligohydramnios
(4) Maternal systemic disease
(5) Congenital abnormalities
b. Intrapartum conditions
   (1) Opioid analgesia at less than one hour before birth
   (2) Use of sedatives or hypnotics at any point in labor
   (3) Chorioamnionitis
   (4) Operative delivery including cesarean birth
   (5) Category III fetal heart rate tracings

Special Considerations and Deviations from Normal

• Premature labor
1. Definitions
   a. Premature labor—onset of regular uterine contractions between 20 and 37 weeks’ gestation with spontaneous rupture of membranes or progressive cervical changes
   b. Premature birth—delivery before 37 weeks’ gestation
      (1) Very preterm: < 32 0/7 weeks of gestation
      (2) Moderately preterm: 32 0/7 weeks of gestation through 33 6/7 weeks of gestation
      (3) Late preterm: 34 0/7 weeks of gestation through 36 6/7 weeks of gestation
   c. Term birth—delivery between 37 and 42 weeks’ gestation
      (1) Early term: 37 0/7 weeks of gestation through 38 6/7 weeks of gestation
      (2) Full term: 39 0/7 weeks of gestation through 40 6/7 weeks of gestation
      (3) Late term: 41 0/7 weeks of gestation through 41 6/7 weeks of gestation
      (4) Post-term: 42 0/7 weeks of gestation and beyond
   d. Small for gestational age (SGA)—birthweight at less than 10th percentile for gestational age; corresponds to IUGR
2. Incidence—approximately 10% of all births in the United States
3. Etiology—approximately 10% of all births in the United States
   a. Idiopathic and multifactorial; in most cases the cause of premature labor is unknown
   b. Maternal factors
      (1) Systemic diseases
         (a) Hypertensive disorders of pregnancy:
            i. Gestational hypertension
            ii. Chronic hypertension
            iii. Preeclampsia
            iv. Chronic hypertension with superimposed preeclampsia
         (b) Renal disease
         (c) Autoimmune disease
         (d) Infection
      (2) Structural uterine abnormalities
         (a) Müllerian defects
         (b) Fibroids
(3) Overdistended uterus
   (a) Multiple gestations
   (b) Polyhydramnios
(4) Cervical insufficiency
(5) History of premature labor
(6) Low socioeconomic factors

   c. Fetal factors
      (1) Premature rupture of membranes—implicated in 30% of all premature labor
      (2) Fetal anomalies
      (3) Placental insufficiency

4. Signs and symptoms
   a. Menstrual-like cramping with increasing frequency and intensity
   b. Pelvic pressure, especially suprapubic
   c. Backache, especially low backache
   d. Passage of amniotic fluid
   e. Change in the character of vaginal secretions
   f. Bloody show/spotting
   g. Progressive cervical dilatation

5. Physical findings
   a. Uterine contractions documented by electronic fetal monitoring (EFM) or palpation
   b. Cervical dilation on digital examination
   c. Documented ruptured membranes

6. Differential diagnosis
   a. Urinary tract infection/pyelonephritis
   b. Round ligament pain
   c. Braxton Hicks contractions
   d. Renal colic
   e. Appendicitis

7. Diagnostic tests to consider
   a. Fern and/or nitrazine test if suspect rupture of membranes
   b. Urinalysis with culture and sensitivity
   c. Other tests for suspected infections—chlamydia, gonococcal infection (GC), wet prep
   d. Fetal fibronectin—collect before digital examination; recent sexual activity or blood may affect results
   e. Ultrasound—cervical length and funneling, placental location and status, biophysical profile, and amniotic fluid index
   f. Amniocentesis—fetal surfactant and lecithin/sphingomyelin (L/S) ratio
   g. CBC with differential

8. Management—consultation with physician regarding need for transfer of care versus co-management
   a. Nonpharmacologic
      (1) Hydration
      (2) Left-lateral bed rest
   b. Tocolysis—generally used to delay birth more than 48 hours in order to give steroids to hasten lung maturity
      (1) Contraindications to tocolysis—any conditions causing a hostile uterine environment
         (a) Placental abruption
         (b) Chorioamnionitis
(c) Severe preeclampsia
(d) Placenta previa
(e) Category III FHR tracing
(f) Lethal fetal anomalies
(g) IUGR without interval growth

(2) Most effective tocolytics—calcium channel blockers (nifedipine)
   (a) Drug action—nonspecific smooth muscle relaxant; prevents influx of extracellular calcium ions into myometrial cells; effect not specific to uterus
   (b) Side effects
      i. Maternal hypotension
      ii. Flushing
      iii. Nausea, vomiting
   (c) Drug interactions
      i. Beta-agonists
      ii. Magnesium sulfate
   (d) Contraindications
      i. Do not use in presence of intrauterine infection, maternal hypertension, or cardiac disease
      ii. Do not use in combination with beta-agonists or magnesium sulfate
   (e) Administration and dosing
      i. Route—PO
      ii. Initial dose of 10 mg
      iii. If contractions continue, repeat doses every 20 minutes for total of 30 mg in one hour
      iv. Once contractions decrease, may give 10 mg every six hours or 30–60 mg sustained release dose per day

(3) Magnesium sulfate (MgSO₄)
   (a) Drug action—acts on vascular smooth muscle causing vasodilatation
   (b) Side effects
      i. Flushing
      ii. Palpitations
      iii. Feeling of warmth
      iv. Lethargy
      v. Muscle weakness
      vi. Dizziness
      vii. Nausea, vomiting
      viii. Respiratory depression
      ix. Pulmonary edema
   (c) Drug interactions—calcium channel blockers
   (d) Contraindications
      i. Do not use concurrently with calcium channel blockers
      ii. Toxic effects at serum level of more than 7 mg/dl.
      iii. Antidote is calcium gluconate
   (e) Administration and dosing
      i. Generally IV; can be given IM
      ii. Loading dose 4–6 g in 100 cc intravenous fluid (IVF) over 20–30 minutes
      iii. Initial maintenance dose 2 g/hour
      iv. If contractions continue, increase by 0.5 g/hour every 30 minutes to a max dose of 4 g/hour
      v. Maintain at effective level for 12 to 24 hours after contractions stop
      vi. No benefit for weaning when discontinued
2. Etiology/predisposing factors
   a. Increased parity
   b. Advanced maternal age
   c. Previous cesarean birth
   d. Multiple gestation

3. Signs and symptoms
   a. Painless vaginal bleeding during the third trimester 70–80% of the time
   b. Bleeding with contractions 10–20%
   c. Can be diagnosed before hallmark bleed with ultrasound

4. Physical findings—no digital vaginal exam until placenta location is known; contraindicated with placenta previa

5. Differential diagnosis—placental abruption

6. Diagnostic testing—ultrasound confirmation

7. Management
   a. Acute bleeding requires emergency cesarean birth
   b. Otherwise depends on severity of symptoms and gestational age
   c. Bed rest and/or hospitalization usually indicated
   d. RhoGAM for unsensitized Rh-negative mother
   e. Delivered by C-section

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• Umbilical cord prolapse

1. Definition—umbilical cord lies below or beside the presenting part; danger is compression of the umbilical cord, thus compromising the blood supply to the fetus

2. Etiology/incidence
   a. Presenting part does not fill the pelvic inlet; can occur with the rupturing of membranes
   b. Incidence—1 in 400 pregnancies

3. Signs and symptoms/physical findings
   a. Umbilical cord visible at or outside introitus
   b. Palpation of cord during vaginal examination
   c. Presumptive diagnosis of occult prolapse if prolonged fetal heart rate deceleration occurs immediately following rupture of membranes

4. Management
   a. Elevate presenting part off cord by continuous vaginal examination
   b. Assist mother into knee–chest position or steep left-lateral Trendelenburg
   c. Do not attempt to manipulate the cord as this may cause cord spasm; if protruding, wrap loosely with warm, normal saline-soaked gauze
   d. Do not rely on cord pulsations as indicator of fetal status—obtain ultrasound if unable to detect fetal heart tones
   e. Immediately alert consulting physician and other staff of emergency
   f. Discontinue oxytocin infusion if applicable
   g. \( \text{O}_2 \) at 10 L/min
   h. Intravenous fluid bolus
   i. Monitor FHR
   j. Consider terbutaline for tocolysis
   k. Prepare for cesarean birth

• Placenta previa

1. Definition—placenta is located over or very near the internal os
   a. Complete placenta previa—placenta completely covers the cervical os
   b. Partial placenta previa—cervical os partially covered by placenta
   c. Marginal placenta previa—edge of placenta within 1 cm of cervical os

2. Etiology/predisposing factors
   a. Increased parity
   b. Advanced maternal age
   c. Previous cesarean birth
   d. Multiple gestation

3. Signs and symptoms
   a. Painful vaginal bleeding during the third trimester 70–80% of the time
   b. Bleeding with contractions 10–20%
   c. Can be diagnosed before hallmark bleed with ultrasound

4. Physical findings—no digital vaginal exam until placenta location is known; contraindicated with placenta previa

5. Differential diagnosis—placental abruption

6. Diagnostic testing—ultrasound confirmation

7. Management
   a. Complete abruption
      (1) Notify consulting physician
      (2) Insert two large-bore IV catheters
      (3) Prepare for STAT C-birth
      (4) Obtain blood type and cross-match for blood products, including clotting factors
      (5) Trendelenberg position
      (6) \( \text{O}_2 \) at 10 L/min
      (7) Monitor fetal status
b. Partial abruption
   (1) IV access
   (2) Monitor fetal status
   (3) Preparation in the event immediate surgical intervention is required

Shoulder dystocia

1. Definition—difficulty in delivery of shoulders secondary to anterior shoulder becoming impacted on the pelvic rim
2. Etiology/risk factors
   a. Gestational diabetes
   b. History of macrosomic babies
   c. Maternal obesity
   d. Increased weight gain during pregnancy
   e. Small/abnormal/contracted pelvis
   f. Prior history of shoulder dystocia
   g. Estimated weight of fetus 1 lb larger than previous infants in a multiparous woman

3. Incidence—less than 1% of all births

4. Morbidity and mortality
   a. Maternal—extensive vaginal and perineal lacerations
   b. Fetal
      (1) Fractured clavicle
      (2) Brachial plexus injury
      (3) Hypoxia/anoxia
      (4) Fetal death

5. Signs and symptoms
   a. Turtle sign—the immediate retraction of the fetal head against the perineum after extension
   b. Delayed restitution or need for facilitated restitution without descent
   c. Inability to deliver anterior shoulder with usual traction effort

6. Management
   a. Anticipation of shoulder dystocia should be an indication or signal of need for emergency preparedness
   b. Immediately have any physician paged STAT
   c. Notify other staff, including anesthesia and the pediatrics team
   d. Instruct client to stop pushing until a maneuver has been successful (see below)
   e. Perform McRobert’s maneuver—place mother in exaggerated lithotomy position (knees to shoulders)
   f. Have suprapubic pressure (not fundal pressure) applied while exerting downward traction on baby’s head while mother is pushing
   g. Cut or extend episiotomy—controversial (and if performed, intent is to increase space for hands to perform necessary maneuvers); catheterize woman to empty bladder
   h. Attempt to rotate shoulders to oblique and repeat McRobert’s maneuver and suprapubic pressure—insert a hand on either side of the fetal chest and attempt to rotate shoulders out of the anteroposterior diameter
   i. Deliver posterior arm
      (1) Insert hand behind posterior shoulder
      (2) Splint arm and sweep across abdomen and chest until the hand can be grasped externally
   j. Attempt Wood’s screw maneuver
      (1) Using the same techniques
      (2) Rotate fetus 180 degrees (keeping the back anterior)
      (3) If still impacted, continue rotation another 180 degrees
   k. Have woman turn to knee–chest position (Gaskin maneuver)—may be difficult with epidural
   l. Break the anterior clavicle—place thumbs along clavicle and force clavicle outward; controversial because it comes with the possibility of puncturing lung or injuring subclavian vessels
   m. Zavanelli maneuver—rotate and flex head while replacing fetus into pelvic cavity, followed by immediate C-section; controversial because it is associated with significant risk of infant morbidity and mortality

Breech delivery

1. The elective vaginal delivery of singleton infants in the breech presentation is not recommended by the American College of Obstetricians and Gynecologists (ACOG); vaginal delivery of a singleton breech presentation is usually reserved only for breeches that present emergently and when birth is essentially inevitable
2. Several studies indicate that breech extraction of a second twin is a safe alternative to cesarean birth, assuming the provider is skilled in vaginal breech births (Gabbe et al., 2017)
3. Definition—delivery of infant presenting with buttocks, feet, or knees
   a. Complete breech—legs and thighs are flexed with buttocks presenting
   b. Frank breech—legs extended on abdomen with flexed thighs and buttocks presenting; most common type of breech presentation
   c. Footling breech—one or both feet presenting
   d. Knee presentation—single or double knees are presenting (most rare)
   e. Spontaneous vaginal breech delivery—birth without additional external assistance
   f. Assisted vaginal delivery (partial breech extraction)—spontaneous delivery to the umbilicus, remainder of the body delivered with assistance
   g. Total breech extraction—entire body extracted by birth attendant

4. Incidence
   a. Three percent to 4% at term
   b. At 28 weeks, 25% of all fetuses are breech
   c. Most convert to cephalic by 34 weeks’ gestation

5. Etiology/risk factors
   a. Presentation possibly related to the fetus accommodating to the shape of the uterus
      (1) Preterm fetuses position the head in the upper portion of the uterus because the head is the larger portion of a fetus’s body
      (2) At term, the largest part of the fetus is the head, thus causing it to descend into the pelvis
   b. Maternal indications
      (1) Gestational age
      (2) Fibroids
      (3) Uterine anomalies
(4) Abnormal placentation
   (a) Placenta previa
   (b) Cornual fundal implantation
(5) Oligohydramnios/polyhydramnios

6. Morbidity/mortality
   a. Cord prolapse (1.5% of frank breech and 10% in other breech presentations)
   b. Traumatic vaginal delivery
      (1) Largest part of the fetus is delivered last
      (2) Head entrapment causing injury to organs, brain, and skull
   c. Increased perinatal morbidity and mortality

7. Management and treatment
   a. Vaginal breech birth is a co-management situation
   b. Criteria for candidates of vaginal breech birth
      (1) Frank breech presentation
      (2) Estimated fetal weight (EFW) 2,500–3,800 g
      (3) Flexion of the fetal head
   c. Management decisions
      (1) Continuous fetal monitoring
      (2) IV access
      (3) Use of oxytocin for protraction disorders very controversial; generally cesarean birth is indicated
      (4) Generous episiotomy
      (5) Empty bladder before second stage
      (6) Should deliver as a double setup in operating room

8. Delivery sequence for partial breech extraction
   a. “Hands off the breech” until the body is born to the umbilicus
   b. Second provider should be maintaining head flexion through the abdominal wall during entire descent
   c. Pull down loop of cord
   d. From this point on, the mother is instructed to push continuously
   e. If the legs have not delivered spontaneously, they should be gently guided out of the vagina
   f. Downward traction then applied with the hands to baby’s hips
      with thumbs in the sacroiliac region to encourage delivery of the anterior scapula
   g. Attendant delivers anterior arm by moving hand up the infant’s back and over the top of the anterior shoulder
      sweeping the arm down across the chest and under the pubis with attendant’s finger
   h. The infant is raised so the posterior arm can be delivered in the same manner
   i. The back should spontaneously rotate anteriorly; it is important not to let the head rotate to the OP position
   j. Employ the Mauriceau-Smellie-Veit maneuver to maintain flexion of the head if needed
      (1) With dominant hand palmar side up, place index and middle fingers on either side of the nose on the maxilla, with
          chest and body resting on palm and legs straddling forearm
      (2) The other hand is placed on top of the baby, with the index finger on one side and middle finger on the other side
          of the neck extending over the shoulder for traction
   k. Again apply downward traction until the suboccipital region
      (the hairline is seen coming under the pubic symphysis)
   l. Now apply upward traction while elevating body to deliver the head via the curve of Carus

• Face presentation
  1. Definition—cephalic presentation with attitude of head in complete extension, with occiput proximal to the spine; usually begins
     labor as a brow presentation
  2. Incidence one in 250 births, higher in multiparas
  3. Etiology
     a. Can be an indicator of cephalopelvic disproportion
     b. Multiple loops of nuchal cord
     c. Tumors of the neck
     d. Anencephalic fetus
  4. Risk factors
     a. If mentum is not anterior, fetus is unable to pass under the pubic symphysis

5. Diagnosis
   a. During Leopold’s maneuver, occipital bone is easily palpated
   b. During vaginal examination, facial landmarks can be palpated

6. Management
   a. Review clinical pelvimetry to ensure pelvic adequacy
   b. Confirm position is mentum anterior because mentum posterior is contraindicated for vaginal birth
   c. Collaborate with consulting physician if protraction disorder occurs
   d. Pediatric attendance at the birth

• Twin gestation—intrapartum twins are always a collaborative management situation
  1. Definitions—multiple gestation with two fetuses in the uterus
     a. Monozygotic twins—zygotic division between four and eight days
        (1) Identical twins
        (2) One placenta
        (3) Generally one chorion, two amnions
     b. Dizygotic twins
        (1) Fraternal twins
        (2) Two placentas
        (3) Two chorions, two amnions
  2. Incidence
     a. Monozygotic twinning rate stable at one per 250 births
     b. Dizygotic twinning rates increasing as a result of assisted reproductive technologies

3. Predisposing factors
   a. Family history
   b. Ovulation induction/in vitro fertilization
   c. Sub-Saharan African descent

4. Diagnosis
   a. Size larger than dates
   b. Auscultation of more than one fetal heartbeat
   c. Abnormal Leopold’s maneuver findings
   d. Ultimate diagnosis by ultrasound
5. Morbidity
   a. Premature labor and birth
   b. Premature rupture of membranes
   c. Malpresentation of second twin
   d. Cord prolapse
   e. Operative delivery for second twin
   f. SGA and IUGR babies
   g. Twin-to-twin transfusion
6. Management decisions
   a. Physician should be collaborating for all intrapartum decisions and present for the birth
   b. Ultrasound confirmation of presentation
   c. Intravenous catheter insertion
   d. Type and screen blood on admission; some facilities require type and cross-match
   e. Continuous fetal monitoring
   f. Anesthesia presence for birth
   g. Pediatric attendance for birth
   h. Ultrasound machine in delivery room
   i. Bladder should be emptied before pushing
7. Management
   a. Birth of the first twin in usual fashion— if nuchal cord is present, do not cut cord; attempt birth with cord intact
   b. Upon delivery, clamp cord and transfer baby to pediatric team
   c. Assistant can guide second twin into the pelvis depending on presentation
   d. Confirm presentation of second twin based on ultrasound
   e. Timing of delivery depends on fetal status
   f. Oxytocin augmentation can be used if contractions do not resume
   g. Birth of second twin
   h. Observe for PPH
8. Retained placenta
   1. Definition— placenta that has not separated from uterine wall after 60 minutes
   2. Predisposing factors
      a. Premature delivery
      b. Chorioamnionitis
      c. Prior cesarean birth
      d. Placenta previa
      e. Grand multiparity
   3. Etiology
      a. Structurally abnormal uterus
      b. Abnormal placenta— incidence has increased with increasing cesarean rates
         (1) Placenta accreta—adherence to myometrium due to partial or total absence of decidua
         (2) Placenta increta— further extension into the myometrium with penetration into the uterine wall
         (3) Placenta percreta— further extension through the uterine wall to the serosa layer
   4. Management
      a. Facilitate usual methods of placental separation
         (1) Allow baby to nurse; nipple stimulation

Normal Postpartum

- Database
  1. Pregnancy highlights
     a. Gravidity/parity
     b. Obstetric history
     c. Pertinent medical history
     d. Antepartal issues/problems
e. Pertinent pregnancy diagnostic tests
   (1) Blood type and Rh
   (2) Rubella titer status
   (3) Hepatitis B status
   (4) HIV status
   (5) Genetic testing
2. Birth information
   a. Type of birth
      (1) Type of delivery
      (2) Type of episiotomy/laceration
      (3) Type of operative birth
      (4) Reason for interventions
      (5) Complications in the intrapartum period
   b. Type of anesthesia/analgesia
   c. Sex of baby
   d. Weight of baby
   e. Apgar scores
   f. Method of feeding
• Physiologic and anatomic changes
  1. Uterus
     a. Immediately contracts to two-thirds to three-quarters of the way between the umbilicus and symphysis pubis, but by 12 hours postdelivery is at the level of the umbilicus
     b. By two weeks, no longer palpated abdominally
     c. By six weeks, returns to slightly larger than prepregnant size
     d. Involution—process of the uterus returning to the prepregnant state
        (1) Involves three steps
           (a) Contraction of the uterus
           (b) Autolysis of myometrial cells
           (c) Regeneration of the epithelium
        (2) Results from cell size reduction not cell number reduction
  2. Lochia
     a. Consists of the breakdown of myometrial placental bed, eschar and decidual cells
     b. Three stages of discharge
        (1) Rubra—first 24–72 hours, superficial layer of decidua sloughs with debris and necrotic remains of the placenta
        (2) Serosa—from day 3 to day 10, serous to serosanguinous secretion
        (3) Alba—until cessation of flow, yellowish or white discharge
     c. Flow increases with additional activity initially but decreases progressively over the puerperium
     d. Total amount 150 to 400 cc
  3. Cervix, vagina, and perineum
     a. Cervix
        (1) Initially appears edematous, dilated 3–4 cm and bruised
        (2) At seven days, 1 cm dilated and by day 10–12, fingertip dilated
        (3) Nonpregnant appearance and texture one month postdelivery
        (4) Multiparous—at completion of involution, external os does not return to its prepregnant appearance; remains somewhat wider with a transverse opening resembling a fish mouth
     b. Vagina
        (1) Initially edematous, relaxed, sometimes bruised with decreased tone
        (2) Rugae return by three weeks postpartum
     c. Perineum
        (1) Edematous with decreased tone immediately after birth
        (2) Laceration and episiotomy repair should be well approximated
        (3) Skin should appear healed at seven days with only linear scarring at six weeks
4. Breasts
   a. Colostrum is produced on birth of baby
   b. Engorgement occurs approximately 72 hours after birth
      (1) Human milk production begins in the upper-outer milk glands
      (2) Filling then occurs medially and inferiorly
      (3) Distention and stasis of vascular and lymphatic circulation causes engorgement as the ducts, lobules, and alveoli fill with milk
   c. Milk ejection reflex develops within the first one to two weeks
5. Hematologic
   a. Within the first hours postdelivery, cardiac output increases 60–80%
   b. Over first 48 hours, as diuresis occurs, plasma volume decreases, and cardiac output normalizes by two weeks
   c. Transient bradycardia may occur in first one to two days postpartum
   d. Pulse elevated during pregnancy and may continue to be elevated for up to an hour postdelivery
   e. Can have transient leukocytosis in initial 48 hours
6. Renal system changes
   a. Diuresis occurs within first five days as a result of extravascular fluid shifts
   b. Bladder can be hypotonic and edematous immediately after the birth; resolves within 24 hours
7. Weight loss
   a. Caloric intake should at least be 1,800 Kcal/day; should be adjusted according to the level of activity of the woman, whether she is breastfeeding, and if she is breastfeeding a singleton or multiples
   b. The recommended weight loss after the first month postdelivery is a maximum of 4.5 lbs/month
8. Gastrointestinal changes
   a. Peristalsis decreased in first 24 hours; increases risk of ileus after cesarean birth
   b. Liver enzymes, including AST and ALT, return to prepregnant values within two weeks
9. Abdominal changes
   a. Diastasis recti found in 75–80% of postpartum women—if diastasis after the postpartum period, future pregnancies will lack sufficient abdominal support, leading to back pain
   b. Striae are common in most postpartum women
10. Endocrine
    a. Breastfeeding women
       (1) Lactation is stimulated and prolactin secreted
11. Vital signs
   a. Temperature
      (1) Stabilizes during the first 24 hours postpartum
      (2) Normal range—98.6–100.4°F
      (3) If > 100.4°F, consider differentials—infection, pulmonary embolism
   b. Pulse
      (1) If > 100 bpm, consider differentials—infection, increased blood loss, pulmonary embolism
   c. Respiratory rate—remains normal
   d. Blood pressure
      (1) Transient increase in blood pressure of up to 5% of baseline in first four days after delivery
      (2) If blood pressure greater than 140/90 mm Hg, evaluate for postpartum hypertensive disorder
      (3) If blood pressure less than 90/60 mm Hg, evaluate causes of hypotension
         (a) Blood loss
         (b) Medication reaction

Assessment of Maternal Response to Baby

• Material–infant bonding and attachment
  1. Bonding is different from attachment
     a. Reva Rubin introduced concept in 1960s
     b. Bonding is the connection from mother to infant
     c. Most studies refer to this material–infant bond as an affective, behavioral, and chemical link
     d. Bonding theory states that in order to achieve optimal development outcomes, a “sensitive period” of bonding between mother and infant should be allowed in the immediate postpartum period; this sensitive period means close contact is necessary and avoidance of separation is a goal
     e. Early skin-to-skin contact at birth or soon afterwards has been noted to promote maternal-infant bonding
  2. Attachment
     a. Mother–infant interaction, typically face-to-face, skin-to-skin
     b. Infant’s attachment to mother is developed through the mother’s responsiveness to the infant’s needs

• Psychological response to childbearing
  1. Positive reactions
     a. Sense of achievement in giving birth
     b. Sense of empowerment and strength
     c. Thrill of new baby
  2. Negative reactions
     a. Sense of loss regarding individual self
     b. Feeling of mistrust of body if unable to complete the birth process or if birth was premature
     c. Feeling of disappointment if labor and delivery did not go as planned
     d. Feeling of frustration if having great difficulty with breastfeeding

• Postpartum blues and depression
  1. Postpartum blues
     a. 80% of all women
     b. Begins within three to five days of birth; concurrent with profound hormonal shifts
     c. Very labile emotions (giddiness through sadness and crying); usually defy explanation
     d. Generally time-limited over one to two weeks
     e. Supportive, sensitive care is usually all that is required
  2. Postpartum depression/psychosis
     a. Approximately 10% incidence of depression; true postpartum psychosis in less than 1% of women
     b. Onset of symptoms around four to six weeks; generally worsen over time
     c. Symptoms are the same as for major depression in nonpostpartum woman
     d. Symptoms can incapacitate women
        (1) Unable to perform activities of daily living
        (2) Can have suicidal, infanticidal, and/or homicidal ideation
        (3) Apathy toward themselves and/or their infants
     e. Symptoms do not improve over time; more likely that symptoms worsen
     f. Screening—screen all postpartum women for depression with scale such as Edinburgh Postnatal Depression Scale; rule out postpartum thyroiditis, anemia, infection, sleep deprivation
     g. Consult psychiatry team for proper diagnosis of psychiatric illness; psychiatric evaluation and treatment usually including medication and initiation of discussion regarding outpatient counseling
     h. Women previously treated for clinical depression have increased risk of postpartum depression
     i. Psychosis—disorganized thinking, behavior, speech; auditory or visual perceptual disturbances; delusions—medical emergency! Need psychiatry team for management of acute episode; once patient is stable, coordination between obstetric providers, nursing, and psychiatry is essential for patient’s recovery

• Grief
  1. Can be related to losing a pregnancy, having a viable fetus/infant but not meeting expectations (i.e., congenital anomalies or organic cause, such as postpartum depression)
2. Stages of grief (Elizabeth Kübler-Ross model)
   a. Denial
   b. Anger
   c. Bargaining
   d. Depression
   e. Acceptance

Management Plan for the Postpartum Period

- Evaluation of maternal well-being
- Chart review
- History
  1. Family history
  2. Past medical, surgical, and obstetric history
  3. Review of prenatal care
  4. Review of intrapartum period
  5. Infant data
- Physical examination
  1. Vital signs
  2. General appearance and affect
  3. Breasts
     a. Condition of breasts and nipples
     b. Status of milk production
  4. Abdominal examination
     a. Uterine fundal examination
        (1) Uterus should feel firm and positioned midline to the body
        (2) Abnormal—uterus feels boggy and/or displaced to one side
           (a) This could be a sign of subinvolution of the uterus caused by retention of placental fragments or uterine infection
           (b) Evaluate for increased bleeding/PPH and/or infection
        b. Abdominal musculature
           (1) Immediately postpartum, the abdominal wall may remain soft and loose
        c. Bladder status
  5. Perineum
     a. REEDA (redness, ecchymosis, erythema, drainage, and approximation)
     b. Lochia
     c. Status of lacerations/episiotomy
     d. Hemorrhoids
  6. Extremities
     a. Calf tenderness and warmth
     b. Edema
     c. Varicosities
  7. Pain assessment
  8. Emotional status
- Diet—after normal birth, regular diet immediately postpartum
- Activity
  1. Out of bed as desired
  2. Should be escorted out of bed for the first time, secondary to risk of syncope
- Hygiene
  1. Should receive instructions in perineal care
  2. Topical anesthetics if indicated
- Contraception
  1. Nonbreastfeeding women may ovulate before the six-week visit; therefore, birth control should be offered before discharge
  2. Hormonal methods—combination hormonal methods, for example, pills, patch, vaginal ring; progestin-only methods, for example, progestin-only pills, depot medroxyprogesterone acetate [DMPA], subdermal implant, levonorgestrel intrauterine contraception
     a. Combination hormonal methods not indicated for breastfeeding women initially postpartum and because postpartum women are still in a hypercoagulable state until about four to six weeks after delivery
     b. DMPA, progestin-only pills, progestin-only subdermal implant, and intrauterine contraception (IUC) types are good choices for breastfeeding women
  3. Barrier methods
     a. Cervical cap/diaphragm—cannot be fit until involution is complete
     b. Male and female condoms—can be used immediately
  4. Spermicides
     a. Foam, cream, vaginal contraceptive film, sponge
     b. Should delay use until lochia ceases
  5. IUC—levonorgestrel or copper-containing
     a. The levonorgestrel or copper-containing IUC can be inserted at any time postpartum, including immediately postpartum
     b. The levonorgestrel or copper-containing IUC should not be inserted in a woman with postpartum sepsis (e.g., chorioamnionitis or endometritis)
  6. Lactation amenorrhea method
     a. Full or nearly full breastfeeding
        (1) Feeding an average of every four hours during the day
        (2) Feeding an average of every six hours at night
        (3) Has not substituted solid foods for breastfeeding for any meals
     b. Infant less than six months old
     c. No menses
     d. Choose alternative method if woman and infant do not fit all three criteria
  7. Tubal ligation
     a. Permanent method of contraception
     b. Most easily accomplished during hospital stay
     c. Generally need to obtain consent before birth
- Diagnostic tests
  1. Complete blood count
     a. Typically ordered for postoperative patients or patients who had complications intrapartum or in the immediate postpartum period (e.g., hemorrhage)
b. Commonly performed first morning after birth
c. Only profound anemia and/or if patient becomes hemodynamically unstable changes management
2. Cord blood testing for blood type, Rh, and Coombs
3. Kleihauer–Betke screen if Rh negative
• Immunizations
1. Rubella vaccine may be given before discharge if not immune to rubella
2. RhoGAM within 72 hours of birth, if indicated
3. If Tdap was not given during pregnancy, offer Tdap vaccine before discharge
4. Depending on the season, offer flu shot

Postpartal Discomforts
• Involutional pain
  1. Likely to increase in intensity with each subsequent birth
  2. Increases with nursing
  3. Nonpharmacologic relief
     a. Maintain empty bladder and bowels
     b. Relaxation and breathing techniques
     c. Changing positions, sitting up, walking
  4. Pharmacologic relief
     a. Acetaminophen, ibuprofen
     b. Opioids such as codeine—use with caution because some women are ultrametabolizers, thus putting infants at risk for respiratory depression due to rapid maternal conversion of codeine to morphine
• Diuresis—maintain fluids to prevent dehydration
• Breast engorgement
  1. Initiate breastfeeding early and often

Questions
Select the best answer.
1. At 38 weeks’ gestation, Ms. Jones presents to your birth center complaining of a small amount of watery, clear-to-whitish vaginal discharge for the past eight hours. She has been having Braxton Hicks contractions for a couple of days. The baby is moving on a regular basis, but now she just “does not feel right.” What would you do in your initial assessment related to her presenting symptoms?
   a. Obtain 20-minute fetal monitor strip to ensure reactivity
   b. Perform sterile speculum exam to rule out rupture of membranes versus vaginal infection
   c. Contact consulting physician regarding premature rupture of membranes protocol
   d. Send Ms. Jones home with reassurance and instructions to rest until better labor pattern is established
2. Mrs. Hogan, a 37-year-old G4 P0 at 35 weeks, presents saying she is having bright red bleeding and clots for 2 hours since intercourse with her husband. She has saturated two pads in two hours. She is not having any pain. The most probable diagnosis is:
   a. placenta previa.
   b. cervical irritation from intercourse.
   c. placental abruption.
   d. normal bloody show.
3. Tocolysis of premature labor contractions is most effectively achieved by:
   a. NSAIDs.
   b. calcium channel blockers such as nifedipine.
   c. intravenous fluids.
   d. oxytocics.
4. Which client is most at risk for placental abruption?
   a. Nineteen-year-old G2 P0010 in preterm labor at 35 weeks
   b. Twenty-eight-year-old G1 smoker pregnant with twins with spontaneous rupture of membranes at 37 weeks
   c. Twenty-eight-year-old G3 P2002 with induced labor at 41 weeks
   d. Forty-one-year-old G1 pregnant who had low-lying placenta in first trimester
5. What is the major risk of multifetal gestation?
   a. Eclampsia
   b. Gestational diabetes
   c. Cephalopelvic disproportion
   d. Preterm birth
6. The cardinal movements of labor and birth for occiput anterior position are which of the following?
   a. Flexion, descent, internal rotation, extension, restitution, external rotation
   b. Descent, flexion, extension, internal rotation, external rotation, restitution
   c. Descent, flexion, internal rotation, extension, restitution, external rotation
   d. Descent, flexion, internal rotation, extension, external rotation, restitution

7. The cardinal movement responsible for the birth of the fetal head in the cephalic presentation is:
   a. flexion.
   b. restitution.
   c. extension.
   d. external rotation.

8. The definition of PPH is blood loss:
   a. that causes the patient to be hemodynamically symptomatic.
   b. in excess of 750 cc during the entire labor.
   c. of more than 500 cc after a C-section.
   d. of 750 cc or more after the third stage of labor.

9. Which of the following statements concerning Apgar scores is correct?
   a. Scoring is especially useful in assessment of the preterm infant.
   b. Scoring is less useful when the infant is post-term.
   c. A score of less than 7 at 1 minute correlates with increased neonatal morbidity.
   d. Five-minute scoring has a relationship to neonatal morbidity and mortality.

10. Infants born to mothers with gestational diabetes are at increased risk for:
    a. hypothermia.
    b. IUGR.
    c. hyperglycemia.
    d. shoulder dystocia.

11. A client who is a G3 P2002 at 38 weeks presents with regular uterine contractions every four to six minutes for 60 seconds for the past eight hours. Her vaginal exam is 2 cm/30%/−2, vertex with intact membranes. She is very uncomfortable with the contractions and declines discharge to home at this time. At this time, the patient is in:
    a. transitional labor.
    b. latent labor.
    c. active labor.
    d. not in labor.

12. For the client described in the previous question, your management plan at this time is:
    a. admit immediately.
    b. ambulate for two hours and then reassess.
    c. contact consulting physician for augmentation of labor.
    d. defer to client's birth plan.

13. Three hours later, you reassess the client from questions 11 and 12. Contractions are now every four minutes for 60 seconds. Her exam is 3 cm/50%/−2, vertex with intact membranes. The fetal heart rate is 150 bpm with audible accelerations by Doppler. At this time your client is in:
    a. the prolonged latent phase.
    b. the latent phase of labor.
    c. the active phase of labor.
    d. an unknown phase of labor because you cannot make a determination based on this information.

14. Nine hours later, the client from questions 11–13 has the same contraction pattern every four minutes for 60 seconds. Her exam is now 3 cm/100%/0, vertex with intact membranes. The fetal heart rate remains in the 140s to 150s with audible accelerations. The client is exhausted and is no longer coping well with the contractions and “just wants it over.” Your diagnosis at this time is that she is in the:
    a. latent phase of labor.
    b. prolonged latent phase of labor.
    c. arrested labor.
    d. protracted active phase of labor.

15. Your management plan at this time for the client in questions 11–14 is:
    a. discharge home with encouragement and instructions to return when the contractions become closer.
    b. contact consulting physician regarding your plan for oxytocin augmentation.
    c. encourage her to continue with her original plan for an unmedicated childbirth.
    d. offer medication of morphine 10 mg IM so she can get some sleep and potentially correct this dysfunctional labor pattern.

16. C.S. presents to your office stating that she is pregnant, and she wants to know her due date. The first day of her last period was February 4. Her due date by menstrual dating (Naegele’s rule) is:
    a. November 11.
    b. October 28.
    c. May 11.

17. The denominator of breech presentation is the:
    a. symphysis pubis.
    b. sacrum.
    c. feet.
    d. shoulders.

18. Your client is in active labor and is making appropriate progress thus far. Currently, her exam is 6 cm/100%/−2, vertex with intact membranes. During your exam, you notice the position of the vertex is LOT and sagittal suture of the fetus is closer to the maternal sacrum. Your diagnosis at this time is:
    a. deep transverse pelvic arrest.
    b. anterior asynclitism.
    c. failure to descend.
    d. posterior asynclitism.

19. Your management plan for the patient in question 18 is:
    a. artificial rupture of membranes.
    b. epidural anesthesia.
    c. pitocin augmentation.
    d. to encourage movement and position change.

20. On the monitor strip of the client from questions 18 and 19, you notice the FHR has intermittently been 100–110 bpm for 20–30 seconds at a time for the past 10–15 minutes with good return to the baseline of 140 bpm. You would document this as:
    a. variable decelerations.
    b. late decelerations.
    c. fetal bradycardia.
    d. you cannot determine how to document from this information.

21. The most favorable diameter of the fetal head to present in labor is the:
    a. verticomental.
    b. submentobregmatic.
    c. occipitofrontal.
    d. suboccipitobregmatic.
22. Intermittent auscultation of the fetal heart rate during labor is:
   a. inferior to continuous electronic fetal monitoring.
   b. acceptable only for out-of-hospital birth.
   c. acceptable for the fetal evaluation of certain patients.
   d. correlated to lower Apgar scores than for babies born after continuous fetal monitoring.

23. Your patient states that she does not want an episiotomy no matter what happens. Your management of this situation is to:
   a. discuss the indications for episiotomy and reinforce that you would obtain consent before performing the procedure if necessary.
   b. teach her perineal massage antenatally and hope that she will not need an episiotomy.
   c. explain to her that skilled midwives never perform episiotomies.
   d. explain that because this is her first baby, she will probably need an episiotomy to prevent serious laceration.

24. A client presents while you are covering Labor and Delivery. She is a 33-year-old G3 P2002 at term, and in labor with ruptured membranes. Your exam reveals 5 cm/90% effaced/0 station, but you are unable to palpate fontanelles or sutures. You suspect that you feel the orbital ridge in the anteroposterior diameter and the chin at 3 o'clock. If this is the case, what is the presentation?
   a. ROT
   b. LMT
   c. RMT
   d. ROA

25. Three hours later, the client in question 24 is completely dilated/100% effaced/0 station with an urge to push. Your exam now reveals that the presentation is MA. What would your next step be?
   a. Prepare client for urgent C-section.
   b. Manually attempt to flex the fetal head.
   c. Encourage patient to push as effectively as possible.
   d. Allow patient to push only in the hands-and-knees position to allow the fetal head to rotate.

26. If a nuchal arm is encountered during an assisted breech birth, what should you do?
   a. Exert steady downward traction on the entire fetus.
   b. Slowly rotate the infant 180 degrees to attempt to dislodge the arm.
   c. Raise the baby in a warm towel above the plane of the vagina.
   d. Sweep the arm down by hooking the elbow and pulling the arm down.

27. The most common cause of PPH is:
   a. sulcus tears.
   b. episiotomy extensions to third- and fourth-degree lacerations.
   c. uterine atony.
   d. cervical lacerations.

28. The process of involution takes place over which of the following time frames?
   a. The first six weeks postpartum
   b. The first 24 hours postpartum
   c. The first two weeks postpartum
   d. The first year postpartum

29. The following is the clinical picture of your client. She is a G1 P0 at 39 weeks with an uncomplicated pregnancy. Her labor started at 4:00 a.m. with regular contractions. She was admitted to 8:00 a.m. when her exam was 2–3 cm/100%/–2 station, vertex, membranes intact.
   At 12:00 p.m., her exam was 3–4 cm/100%/–2, intact.
   At 4:00 p.m., her exam was 4 cm/100%/–2, intact.
   At 7:30 p.m., her exam was 5–6 cm/100%/–1, intact.
   At 8:15 p.m., she ruptured membranes for light meconium-stained fluid.
   At 10:00 p.m., her exam was 8 cm/100%/0 station.
   Based on the information provided, at 12:00 p.m. what was the most appropriate diagnosis related to your client's labor progress?
   a. Latent phase
   b. Protracted latent phase
   c. Unable to make determination with this information
   d. Active labor

30. For the patient in question 29, what was the most appropriate diagnosis at 7:30 p.m.?
   a. Unable to make determination based on the information provided
   b. Active phase of labor
   c. Latent phase of labor
   d. Arrest of labor in the active phase

31. At 10:00 p.m., the patient in questions 29 and 30 requests something for pain because she states that the pain is intolerable now and she is feeling increased pelvic pressure. What would not be indicated for pain relief at this time?
   a. Epidural anesthesia
   b. Intravenous opioids
   c. Pudendal anesthesia
   d. Paracervical block

32. At 10:50 p.m., you notice on the fetal monitor strip early decelerations that occur with every contraction. The baseline heart rate is in the 140s with average variability. What do you suspect the cause of these decelerations is?
   a. Maternal hypotension
   b. Head compression
   c. Uteroplacental insufficiency
   d. Fetal distress related to the meconium fluid

33. The benefit of placing an internal scalp electrode on a fetus in labor is:
   a. the ability to have a continuous tracing when external monitoring is insufficient.
   b. the ability to detect decelerations.
   c. that it keeps the client in bed.
   d. the ability to assess variability.

34. If you are performing scalp stimulation, what is the fetal response that indicates fetal well-being?
   a. An FHR deceleration to 100 bpm for 2 minutes
   b. An acceleration of 5 bpm over baseline for 5 seconds
   c. A variable deceleration
   d. A fetal heart rate acceleration of 15 bpm for 15 seconds

35. What is the most common position in which the fetus enters the pelvis for birth?
   a. ROA
   b. LOA
   c. ROP
   d. LOP

36. The long arc rotation is most commonly performed by babies beginning labor in which presentation?
   a. LOP
   b. LSA
   c. ROA
   d. LOA
37. In the second stage of labor, how frequently should the BP of low-risk women be checked?
   a. Every 30 minutes
   b. Every 2 minutes
   c. Every 60 minutes
   d. Every 15 minutes

38. When is the most optimal time to administer pudendal anesthesia for perineal pain relief in the multiparous client?
   a. For the repair of any laceration or episiotomy
   b. When the head distends the perineum and client complains of the "ring of fire"
   c. When the vertex is at +2
   d. At approximately 8–9 cm dilated

39. What is the largest group of muscles in the pelvic musculature?
   a. Levator ani
   b. Puboccygeus
   c. Bulbocavernosus
   d. Sphincter ani

40. In a second-degree laceration, which structure is not involved?
   a. Vaginal mucosa
   b. Deep transverse perineal muscles
   c. Rectal sphincter
   d. Hymenal ring

41. The Ritgen maneuver is used to:
   a. slow down the descent of the fetal head during birth.
   b. control expulsion of the fetal head at the time of birth.
   c. avoid lacerations or the need for an episiotomy.
   d. assist in the delivery of the fetal head during extension.

42. What complication may be encountered if a placenta is delivered by the Duncan mechanism?
   a. Increased perineal lacerations
   b. Increased bleeding
   c. Increased hemorrhoids due to extra maternal pushing effort
   d. Uterine inversion

43. Which of the following would not be included in the differential diagnosis of premature labor?
   a. Urinary tract infection
   b. Appendicitis
   c. Renal colic
   d. Heartburn

44. The fetal heart rate variability is predominantly controlled by the:
   a. parasympathetic/sympathetic nervous system.
   b. baroreceptors.
   c. chemoreceptors.
   d. central nervous system.

45. During uterine contractions, intervillous blood flow to the placenta
   a. increases.
   b. decreases.
   c. remains unchanged.
   d. has not been studied in humans.

46. Moderate variability of the FHR is a change of how many BPM from the baseline?
   a. Fewer than 2
   b. 2–6
   c. 6–25
   d. > 25

47. Which of the following would not cause an alteration in the variability of the FHR?
   a. Medications
   b. Congenital cardiac anomalies of the fetus
   c. Placenta previa
   d. Fetal activity patterns

48. Your client, who you are co-managing with your consulting physician, is 33 weeks and 4 days pregnant. She is admitted with premature labor, with a cervical exam of 2–3 cm/80%–1, vertex, intact. She is currently on MgSO₄ at 3.0 g/hour with occasional contractions. During rounds, she complains of feeling flushed and hot; lethargic; and sort of short of breath, which usually gets better when she changes position. Which response would be best to address her complaints?
   a. “The MgSO₄ commonly makes you feel like this, but hopefully they will start weaning the medication today.”
   b. “Well, because you are almost 34 weeks, I could ask the doctor if we can discontinue the medication now.”
   c. “I do not think that you should be having shortness of breath like you are; I am going to have the physician see you and order a chest radiograph.”
   d. “Being a little uncomfortable is so much better than giving birth to a 33-week-old infant.”

49. Which of the following conditions would not necessitate continuous fetal monitoring?
   a. Labor at 41 weeks and 1 day
   b. Thick, meconium-stained fluid
   c. Nonreactive NST who is now in labor
   d. IV narcotics

50. Mothers in premature labor are given glucocorticosteroids to:
   a. help stop uterine contractions.
   b. prevent infections, especially chorioamnionitis.
   c. speed the maturation of the fetal respiratory system, including the production of surfactant.
   d. prevent muscle wasting commonly seen in bed-rest patients.

51. Kelly Jones, a G3 P2002 at 37 weeks and 1 day, presents to Labor and Delivery with regular contractions every two to three minutes for five hours. Your vaginal exam reveals 6 cm/100%–2, LSA with ruptured membranes positive for light meconium. What is your next step?
   a. Admit for expectant management.
   b. Discuss with Kelly her birth plan.
   c. Await a reactive tracing before making a management plan.
   d. Notify your consulting physician and prepare for a C-section.

52. A complete breech presentation is described as:
   a. one or two feet are the presenting part.
   b. both hips and knees are flexed, with buttocks presenting.
   c. the baby is flexed at the hips.
   d. the knees are the presenting part.

53. Your client, who is 41 weeks and 5 days pregnant, presents for postdates testing, including a nonstress test. When you assess the tracing after 20 minutes, the FHR is 140–145 bpm, there are no decelerations, and the variability is moderate, but the tracing does not meet criteria for reactivity. What would you do?
   a. Admit the client and induce labor.
   b. Begin a contraction stress test.
   c. Use the vibroacoustic stimulator.
   d. Continue nonstress test for another 20 minutes.
54. The client in question 53 is now in labor, at 4 cm/100%/+1, vertex, and she is having contractions every three to five minutes for 50–70 seconds, which are moderate to palpation. The FHR baseline is still in the 140s, but she is having variable decelerations to the 110s with good return to baseline and average variability. What action would be contraindicated at this time?
   a. Allowing the patient to get into the Jacuzzi
   b. Beginning oxytocin augmentation
   c. Inserting an intravenous catheter
   d. Expectant management

55. Engagement occurs when the:
   a. fetal head reaches the pelvic floor.
   b. widest diameter of the presenting part descends to or below the pelvic inlet.
   c. biparietal diameter is just above the pelvic inlet.
   d. head is on the perineum.

56. When an IUPC is used for the assessment of uterine contractions, the adequacy is quantified:
   a. in millimeters of mercury.
   b. as mild, moderate, and strong.
   c. in Montevideo units.
   d. in centimeters.

57. By internal monitoring of uterine contractions, which of the following must be achieved in the course of 10 minutes in order to be considered adequate contractile strength to dilate the cervix?
   a. 80–100 Montevideo units
   b. 80–100 mm Hg
   c. 200–250 Montevideo units
   d. 200–250 mm Hg

58. Which of the following would represent a contraindication for the use of an IUPC?
   a. Maternal birth plan
   b. Breech presentation
   c. HIV
   d. Lack of labor progress

59. In the first stage of labor for low-risk laboring women, the interval for intermittent FHR auscultation is:
   a. 15 minutes.
   b. 20 minutes.
   c. 30 minutes.
   d. 60 minutes.

60. All of the following are risk factors for preterm labor except:
   a. age.
   b. smoking.
   c. race.
   d. sex of fetus.

61. Shelley Blank is seen in Labor and Delivery at 33 weeks and 1 day complaining of menstrual-type cramping for the past three hours. She denies bleeding or ruptured membranes. The fetus is active. The EFM reveals occasional uterine contractions approximately every 8–12 minutes. The FHR is 135–140 bpm. Which of the following tests would be most important in formulating your management plan?
   a. Complete blood count
   b. Cervical culture
   c. Urine culture
   d. Ultrasound

62. What would be the next step in your management plan for the patient in question 61?
   a. Expectant management until the lab results are back
   b. Tocolysis
   c. Pain management
   d. Additional information is necessary to formulate the management plan.

63. Which of the following represents a risk factor for shoulder dystocia?
   a. Advanced maternal age
   b. Epidural anesthesia
   c. Polyhydramnios
   d. Maternal obesity

64. Which of the following elective vaginal births is no longer recommended?
   a. Brow presentation
   b. Face presentation
   c. Breech presentation
   d. Vertex presentation

65. During the birth of twins, which represents a maneuver that should not be performed?
   a. Artificial rupture of membranes
   b. Clamping and cutting of a nuchal cord
   c. McRobert’s maneuver
   d. Breech delivery of the second twin

66. Which of the following represents a risk factor for retained placenta?
   a. Preterm delivery
   b. Multiple gestation
   c. Multiparity
   d. Post-term pregnancy

67. While repairing a first-degree laceration, you notice a continual trickle of bright red blood from the vagina. As you continue your repair, the bleeding becomes slightly more brisk. What would be the next step after fundal massage in your management plan?
   a. Bimanual compression
   b. Adding 20 additional units of oxytocin in the IV
   c. Discussion with the consulting physician regarding management plan
   d. Methylergonovine IM if BP is normotensive

68. Thirty-six hours after birth, you find Megan, a 16-year-old, crying quietly with the baby in her room as you perform a.m. rounds. What would be the most helpful response?
   a. Prescribe an Selective serotonin reuptake inhibitor (SSRI) because adolescents are prone to postpartum depression.
   b. Encourage her to focus on her baby’s needs as her first priority now.
   c. Explain that it is normal to have a combination of sadness and euphoria so close to the time of the birth.
   d. Conduct a screening test for possible postpartum depression.

69. During postpartum rounds, your multiparous client is very pleased with her birth and is clearly bonding with her new baby girl. She is successfully nursing her baby every three hours for five minutes. She is asking about early discharge and wants to go home as soon as possible. Her only complaint is that her left leg is sore because she
needed to deliver in stirrups. What would be the most important piece of your assessment?
   a. Availability of assistance at home with her two other children to ensure that she can rest
   b. Breast exam and assessment to check for milk production to ensure adequacy of feeding before discharge
   c. Dietary recall to ensure adequate kcal and fluids to produce adequate human milk
   d. Examination of the lower legs to be sure that the muscle strain that she is complaining about is simply related to positioning

70. The same client would like to resume birth control before discharge. Which method would be most appropriate for this client?
   a. DMPA
   b. IUD
   c. Combination birth control pills
   d. Diaphragm with spermicidal cream

71. During the second stage of labor for the high-risk client, the fetal heart rate should be monitored:
   a. every 5 minutes.
   b. every 15 minutes.
   c. every 30 minutes.
   d. continuously.

72. A sudden bradycardia seen in the second stage of labor after an uneventful labor course and previously normal fetal heart tracing is commonly caused by:
   a. a vagal response in the fetus related to descent.
   b. fetal hypoxia related to length of labor.
   c. cord prolapse.
   d. uteroplacental insufficiency.

73. Which of the following FHR tracings are indicative of a Category III FHR tracing?
   a. A prolonged deceleration with recovery to baseline and with moderate variability
   b. Variable decelerations that become more pronounced during the second stage but with normal FHR between pushing efforts
   c. Late decelerations and an absence of variability
   d. Late decelerations with return to baseline and moderate variability between decelerations

74. The risk factor that is most predictive of a preterm birth during a current pregnancy is:
   a. uterine contractions.
   b. prior preterm labor.
   c. prior preterm birth.
   d. gestational hypertension.

75. The pain of the second stage of labor is caused by:
   a. uterine muscle hypoxia with lactic acid buildup and distention of the musculature of the pelvic floor.
   b. a full bladder.
   c. pressure on the bony pelvis, urethra, bladder, and rectum.
   d. fundal uterine displacement and extension of the fetal lie.

76. Hemodynamic changes during the initial postpartum period include:
   a. elevated cardiac output for up to 48 hours after the birth.
   b. decreased white blood count (WBC) during the first 72 hours postpartum.
   c. elevated blood pressure for 48 hours after the birth.
   d. decreased urine output for the first 24 hours.

77. In the initial newborn period, a 10-minute Apgar score is performed:
   a. routinely.
   b. if the 1-minute Apgar score is less than 7.
   c. if the 5-minute Apgar score is less than 7.
   d. if the combined Apgar score at 1 and 5 minutes is less than 16.

78. The bluish discoloration of the baby’s hands and feet within the first 24–48 hours after birth is:
   a. acrocyanosis.
   b. circumoral cyanosis.
   c. central cyanosis.
   d. Mongolian spots.

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**Answers with Rationales**

1. b. Perform sterile speculum exam to rule out rupture of membranes versus vaginal infection
   A sterile speculum examination should be performed if ruptured membranes are suspected.

2. a. Placenta previa
   With placenta previa, painless vaginal bleeding occurs 70–80% of the time.

3. b. Calcium channel blockers such as nifedipine
   Recent research has determined that calcium channel blockers are most effective for tocolysis.

4. b. Twenty-eight-year-old G1 smoker pregnant with twins with spontaneous rupture of membranes at 37 weeks
   Tobacco use is a significant risk factor for placental abruption.

5. d. Preterm birth
   Preterm labor and birth are major risks in multifetal gestations.

6. c. Descent, flexion, internal rotation, extension, restitution, external rotation
   The cardinal movements of labor are: descent, flexion, internal rotation, extension, restitution, external rotation

7. c. extension
   The fetal head is born by the process of extension.

8. a. that causes the patient to be hemodynamically symptomatic.
   Current definition of PPH is excessive, delivery-related blood loss that causes the patient to be hemodynamically symptomatic and/or hypovolemic (Gabbe et al., 2017).

9. d. Five-minute scoring has a relationship to neonatal morbidity and mortality.
   Five-minute scoring is more predictive of neonatal morbidity and/or mortality than is 1-minute scoring.

10. d. shoulder dystocia.
    Gestational diabetes is one of the risk factors for shoulder dystocia.

11. b. latent labor.
    Latent phase of labor is from onset of labor until 4–6 cm.

12. b. ambulate for two hours and then reassess.
    Ambulation for two hours allows the clinician to evaluate for cervical change (definition of labor). The client’s perception of need for admission to the birthing facility is also important in clinical decision making.
13. b. the latent phase of labor
The latent phase of labor is from onset of labor until 4–6 cm.

14. b. prolonged latent phase of labor.
Client is exhausted with abnormal latent phase.

15. d. offer medication of morphine 10 mg IM so she can get some
sleep and potentially correct this dysfunctional labor pattern.
Morphine is quite effective for maternal exhaustion due to
prodomal/prolonged latent phase of labor.

Naegle's rule is to add seven days to the first day of the last men-
strual period and subtract three months.

17. b. sacrum.
The sacrum is the denominator for breech presentations.

18. b. anterior asynclitism.
Anterior asynclitism is noted when the sagittal suture is closer to
the sacrum.

19. d. to encourage movement and position change.
Movement and position change can encourage the fetus to descend
into a favorable position for birth.

20. a. variable decelerations.
Variable decelerations are abrupt in nature with a decrease in
FHR from baseline of ≥ 15 bpm lasting ≥ 15 seconds but less than
2 minutes.

21. d. suboccipitobregmatic.
When the fetal head meets the resistance of the pelvic floor, flexion
is encouraged so that the most favorable diameter (suboccipito-
bregmatic) presents.

22. c. acceptable for the fetal evaluation of certain patients.
Intermittent auscultation is an acceptable method of assessing fetal
well-being in low-risk clients.

23. a. discuss the indications for episiotomy and reinforce that you
would obtain consent before performing the procedure if necessary.
Although episiotomy is no longer a routine procedure, there are spe-
cific indications for its use, which should be discussed with the client.

24. b. LMT
Face presentation—the denominator is the mentum.

25. c. Encourage patient to push as effectively as possible.
More than 90% of anterior face presentations deliver vaginally

26. d. Sweep the arm down by hooking the elbow and pulling the arm
down.
It is important to remain calm and guide the arm in a physiologic
range of motion.

27. c. uterine atony.
Uterine atony is the most common cause of PPH.

28. a. The first six weeks postpartum
Normal postpartum involution takes a full six weeks to be
complete.

29. a. Latent phase
The latent phase of labor is from the onset of labor until 4–6 cm.

30. b. Active phase of labor
The active phase of labor is from 4–6 cm until complete dilatation.

31. b. Intravenous opioids
Intravenous opioids should not be used when birth is anticipated
within an hour because of the risk for respiratory depression in the
newborn.

32. b. Head compression
Early decelerations are due to a vagal response from head compres-
sion and are considered benign.

33. a. the ability to have a continuous tracing when external monitor-
ing is insufficient.
An internal scalp electrode allows for accurate, continuous fetal
monitoring when an external monitor is not producing a reliable
continuous tracing.

34. d. A fetal heart rate acceleration of 15 bpm for 15 seconds
A fetal heart rate acceleration indicates a fetal pH of ≥ 7.20.

35. b. LOA
Left occiput anterior (LOA) is the more common position for the
fetus to enter the pelvis for birth.

36. a. LOP
Most babies who are in posterior position undergo the long arc
rotation to anterior before birth.

37. d. Every 15 minutes
Blood pressure should be evaluated every 15 minutes in the second
stage of labor for low-risk women.

38. d. At approximately 8–9 cm dilated
The optimal timing for administration of pudendal anesthesia is
just before complete dilatation in a multiparous client because it
provides coverage for the birth as well as any repair needed.

39. a. Levator ani
The largest group of muscles in the pelvic musculature is the
levator ani.

40. c. Rectal sphincter
A second-degree laceration involves the vaginal mucosa, posterior
fourchette, perineal muscles, and perineal skin.

41. d. assist in the delivery of the fetal head during extension.
The Ritgen maneuver can be used to expedite the delivery of the
fetal head when necessary.

42. b. Increased bleeding
Bleeding is more visible and likely to be increased because of
incomplete separation of the placenta.

43. d. Heartburn
The other conditions, urinary tract infection, appendicitis, and
renal colic, may mimic the signs and symptoms of preterm labor,
whereas heartburn does not.

44. a. parasympathetic/sympathetic nervous system.
Fetal heart rate variability is controlled predominantly by the au-
tonomic nervous system (parasympathetic/sympathetic).

45. b. decreases.
During a uterine contraction, the intramyometrial pressure exceeds
that of the spiral arteries, resulting in decreased intervillous blood
flow.

46. c. 6–25
Moderate variability is defined by an amplitude range of 6–25 bpm.

47. c. Placenta previa
The other choices, medications, congenital cardiac anomalies, and
fetal activity, are known factors that influence FHR variability.

48. c. “I do not think that you should be having shortness of breath
like you are; I am going to have the physician see you and order a
chest radiograph.”
Shortness of breath is not a typical side effect of magnesium sulfate
and should be investigated.
49. a. Labor at 41 weeks and 1 day
   Forty-one weeks and 1 day is normal gestation (i.e., not preterm or postdates). The other choices—thick, meconium-stained fluid; nonreactive nonstress test; and IV narcotics—entail risk factors that would necessitate continuous fetal monitoring.

50. c. speed the maturation of the fetal respiratory system, including the production of surfactant.
   Corticosteroid administration accelerates fetal lung maturity.

51. d. Notify your consulting physician and prepare for a C-section.
   If a nuchal cord is present, it should not be cut, and birth should be attempted with the cord intact.

52. b. both hips and knees are flexed, with buttocks presenting
   A complete breech has both hips and knees flexed (like a cannonball dive) and is the most common type of breech presentation.

53. d. Continue nonstress test for another 20 minutes.
   The fetus has sleep/wake cycles, so nonreactivity may be due to fetal sleep. Extending the time of the test is common practice to account for this.

54. a. Allowing the patient to get into the Jacuzzi
   Variable decelerations are an indication for continuous monitoring, which cannot be accomplished in the Jacuzzi.

55. b. widest diameter of the presenting part descends to or below the pelvic inlet.
   The widest diameter of the fetal head is the biparietal diameter. The definition of engagement is when the biparietal diameter has cleared the pelvic inlet. Once the head is engaged, the leading edge of the fetal head is at the level of the ischial spines (0 station).

56. c. in Montevideo units.
   While the IUPC quantifies the strength of the contractions in millimeters of mercury, adequacy is determined by the average number of Montevideo units over a 10-minute period.

57. c. 200–250 Montevideo units
   Adequate contraction strength is indicated by 200–250 Montevideo units over a 10-minute period.

58. c. HIV
   Attempts should be made to minimize possible transmission of maternal blood to the fetus, which could occur with placement of an IUPC.

59. c. 30 minutes.
   This is the low-risk protocol for auscultation of the FHR.

60. d. sex of fetus.
   The other risk factors—age, smoking, and race—are evidence-based risk factors for preterm labor. Research does not support sex of the fetus as a risk factor for preterm labor.

61. c. Urine culture
   A urinary tract infection can mimic—and is a risk factor for—preterm labor.

62. d. Additional information is necessary to formulate the management plan
   The information listed is incomplete to formulate a management plan.

63. d. Maternal obesity
   Maternal obesity is a risk factor for a macrosomic infant. Macrosomic infants are at greater risk for shoulder dystocia.

64. c. Breech presentation
   Vaginal delivery of breech presentations should be reserved only for breeches that present emergently and when birth is essentially inevitable. Brow presentations often convert to vertex as labor advances and the head encounters the pelvic floor.

65. b. Clamping and cutting of a nuchal cord
   If a nuchal cord is present, it should not be cut, and birth should be attempted with the cord intact.

66. a. Preterm delivery
   Preterm birth is a predisposing factor for retained placenta.

67. d. Methylergonovine IM if BP is normotensive
   Methylergonovine causes sustained, tetanic uterine contractions but is contraindicated in hypertensive patients. Bimanual compression would be indicated if bleeding is very brisk, for example, like “a fire hose”.

68. c. Explain that it is normal to have a combination of sadness and euphoria so close to the time of the birth.
   Provide the patient with an explanation of normal psychological response to childbirth.

69. d. Examination of the lower legs to be sure that the muscle strain that she is complaining about is simply related to positioning.
   It would be important to examine her lower extremities to assess for possible deep vein thrombosis (DVT).

70. a. DMPA
   DMPA is an acceptable contraceptive method that can be administered before discharge.

71. b. every 5 minutes or d. continuously
   Both of these are acceptable answers for the frequency for auscultation in the second stage, per ACOG for the high-risk client.

72. a. a vagal response in the fetus related to descent.
   With rapid descent, a vagal response can occur.

73. c. Late decelerations and an absence of variability
   A Category III tracing shows an absence of FHR variability.

74. c. prior preterm birth.
   Prior preterm birth is a very strong risk factor for subsequent preterm birth.

75. c. pressure on the bony pelvis, urethra, bladder, and rectum
   The descent of the fetus causes pressure on pelvic structures.

76. a. elevated cardiac output for up to 48 hours after the birth.
   Within the first hours postdelivery, cardiac output increases 60–80%.

77. c. if the 5-minute Apgar score is less than 7.
   Apgar scores are performed routinely at 1 and at 5 minutes, with a 10-minute Apgar usually performed only if the 5-minute Apgar score is less than 7.

78. a. acrocyanosis.
   The bluish discoloration of the baby’s hands and feet is normal in the first 24–48 hours after birth and is known as acrocyanosis.


Physiologic Transition to Extrauterine Life

- Immediate extrauterine transition—immediate transition from intrauterine to extrauterine life depends on changes in four major areas: respiration, circulation, thermoregulation, and glucose regulation.

- Respiratory changes
  1. Must immediately begin respiration upon delivery
  2. Factors in initiation of respiration
     a. Biochemical—relative hypoxia at the end of labor
     b. Physical stimuli—cold, gravity, pain, light, noise
     c. Recoil from pressure on thorax while passing through vagina
  3. Sustained respiration depends on coordinated response of the following
     a. Central nervous system (CNS) respiratory center
     b. Aortic and carotid chemoreceptors
     c. Thoracic mechanoreceptors
     d. Diaphragm and respiratory muscles
  4. Initial breathing serves the following purposes
     a. Assist in conversion from fetal to extraterine circulation
     b. Clear lungs of fluid
     c. Establish lung volume and expand alveoli
  5. Characteristics of normal newborn respiration
     a. Respiratory rate 30 to 60 breaths per minute
     b. Irregular/fluctuating pattern
     c. Diaphragmatic and abdominal breathing
     d. Observe nose breathing
     e. Absence of nasal flaring, grunting, and retractions

- Circulatory changes
  1. Transition from fetal to adult circulation begins with clamping of the umbilical cord and continues throughout the first weeks of life
  2. Characteristics of fetal circulation
     a. Low-pressure system, including placenta (low-resistance circuit)
     b. Minimal circulation to lungs; bypassed via foramen ovale and ductus arteriosus
     c. Foramen ovale favors circulation of most oxygen-rich blood to the brain
  3. Transition from fetal to neonatal circulation
     a. Increased systemic resistance due to loss of placental circuit
     b. Increased pressure in left atrium causes functional closure of foramen ovale
     c. Initial respiration opens pulmonary vasculature, favoring circulation to lungs
     d. Increased oxygenation of circulating blood causes constriction and functional closure of ductus arteriosus
     e. Absence of placental circulation closes ductus venosus

- Thermoregulation
  1. Mechanisms of neonatal heat loss
     a. Convection
     b. Conduction
     c. Radiation
     d. Evaporation
  2. Neonate creates heat in three ways:
     a. Shivering (inefficient)
     b. Muscle activity (limited benefit)
     c. Thermogenesis by metabolism of brown adipose tissue (BAT)
        (1) BAT stores are decreased in preterm and growth-restricted fetuses
        (2) Hypoglycemia decreases efficiency of BAT metabolism
  3. Consequences of cold stress
     a. Increased oxygen consumption, leading to relative hypoxia and acidosis
     b. Metabolism of BAT and release of fatty acids decreases pH
     c. Increased use of glucose, depletion of glycogen stores, and hypoglycemia
d. Worsening hypoglycemia and acidosis may result in respiratory distress

4. Management
   a. Skin-to-skin contact on mother's chest or abdomen with blanket over both
   b. Prewarm blankets and resuscitation area
   c. Dry the newborn immediately and replace wet blankets
   d. Regulate room temperature and minimize exposure to air convection
   e. Postpone newborn bath at least two hours
   f. Keep newborn warm and wrapped

- Glucose regulation
  1. Glycogen stores
     a. Predominantly in liver
     b. Accumulated in third trimester
  2. Risk factors for neonatal hypoglycemia
     a. Infants of diabetic mothers
     b. Small for gestational age (SGA) or large for gestational age (LGA)
     c. Preterm or post-term
     d. Intrapartum—perinatal acidemia, beta-agonist tocolysis, IV glucose administration
     e. Maternal substance abuse
  3. Glucose regulation in the healthy neonate
     a. Normal physiologic decrease in blood glucose appears to be essential to stimulate physiologic processes promoting glucose production
        (1) Lowest at 1–1.5 to 5 hours after birth
        (2) Stabilizes at three to four hours after birth
        (3) The definition of hypoglycemia in the neonate has been controversial; the American Academy of Pediatrics (AAP) guidelines underscore the need to measure glucose levels as soon as possible in symptomatic infants; if symptomatic and < 40 mg/dl, IV glucose is recommended for treatment (Snell & Gardner, 2017).
        (4) For infants without symptoms, ideally infants should feed within one hour of birth, and glucose should be screened 30 minutes after feeding; management protocols may vary per facility, but by 4–24 hours of age, blood glucose levels should remain ≥ 45 mg/dl
     b. Indications for treatment with intravenous dextrose
        (1) Symptomatic infants < 40mg/dl, or those with initial serum glucose less than 25 mg/dl, even without symptoms
        (2) Asymptomatic infants with persistent serum glucose less than 45 mg/dl.
     c. Mean glucose levels from 4 to 72 hours are 60 to 70 mg/dl.
     d. Sources and mechanisms of glucose maintenance
        (1) Intake of human milk or formula
        (2) Glycogenolysis (use of glycogen stores)
        (3) Gluconeogenesis (production of glucose from free fatty acids), glycerol, and amino acids
  4. Signs and symptoms of hypoglycemia
     a. Weak cry
     b. Jitteriness
     c. Cyanosis
     d. Apnea
     e. Lethargy
     f. Poor feeding

5. Management
   a. Encourage feeding as soon as possible
   b. Observe for signs/symptoms of hypoglycemia
   c. Assess glucose levels if signs/symptoms or risk factors are present

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Ongoing Extrauterine Transition

- Changes in the blood
  1. Red blood cells (RBCs)
     a. Hemoglobin F
        (1) Predominates in fetal circulation
        (2) High affinity for oxygen
        (3) Gradually eliminated in first month of life
     b. Short RBC life span leads to increased bilirubin and physiologic jaundice
     c. Cord clamping
        (1) Evidence of benefit for infant (particularly, if preterm) with delayed cord clamping (till pulsation stops, mean of approximately 2 minutes) versus immediate cord clamping
        (2) Neutral position on maternal abdomen is preferable
        (3) Below introitus—theoretically may cause placental transfusion and polycythemia
     d. Normal values
        (1) Hemoglobin
           (a) Newborn 13.7–20.0 g/dL
           (b) Slight rise in first few days of life due to decreased plasma volume
        (c) Mean value at 2 months of age 12.0 g/dL
        (2) Hematocrit 43–63%
        (3) RBC count 4.2–5.8 million/mm³
        (4) Reticulocytes 3–7%
  2. White blood cells (WBCs) normal value—10,000–30,000/mm³
  3. Platelets
     a. Normal value—150,000–350,000/mm³
     b. Relatively low levels of vitamin K–dependent clotting factors
  4. Obtaining blood samples
     a. Venous stasis in extremities may lead to false values from heel-stick samples
     b. No longer recommended to use heel warmer before obtaining sample (evidence has not shown benefit)
     c. Confirm abnormal results with venipuncture sample

- Changes in the gastrointestinal (GI) system
  1. Relatively mature aspects of the neonatal GI system
     a. Suckling/swallowing
     b. Gag and cough reflexes
  2. Relatively immature aspects of the neonatal GI system
     a. Limited ability to digest fats and proteins
     b. Better absorption of monosaccharides than polysaccharides
c. Frequent regurgitation due to
   (1) Incomplete development of cardiac sphincter
   (2) Limited stomach capacity (less than 30 cc)

   d. “Gut closure”
      (1) Maturation process of intestinal lining and its enzymes
          and antibodies
      (2) Vulnerability to bacteria, viruses, and allergens until
          process is complete
      (3) Promoted by breastfeeding

   e. Large intestine
      (1) Less efficient water conservation than in adult
      (2) Predisposes infant to dehydration

• Changes in the immune system
  1. Natural immunity
     a. Physical and chemical barriers (skin, mucosa, gastric acid)
     b. Phagocytes (neutrophils, monocytes, macrophages)
        (1) Immature phagocytic response
        (2) Relative inability to localize infection
  2. Acquired immunity
     a. Maternal IgG crosses placenta, conferring passive immunity to
        viruses the mother has encountered
     b. Breastmilk provides maternal antibodies
     c. Active production of IgG develops slowly throughout childhood
        as passive immunity diminishes
  3. Immaturity of natural and acquired immune systems predisposes
     the newborn to infection and sepsis
  4. Recent research suggests protective effect of microbial flora of the
     vagina (vaginal microbiome) on infant’s health (for infants born
     vaginally); breastfeeding also helps to establish healthy microbial
     colonization (King et al., 2015)

• Changes in the renal system
  1. Limited renal circulation
  2. Decreased glomerular filtration rate
  3. Immature tubular function
     a. Relative inability to concentrate urine
     b. Predisposition to fluid and electrolyte imbalances

Immediate Care and Assessment
of the Healthy Newborn

• Assessment prior to birth of pertinent maternal history
  1. Genetic history
     a. Family history of structural or metabolic defects
     b. History of genetic syndromes
  2. Maternal elements
     a. Social determinants/demographic factors
        (1) Maternal age of younger than 16 years or older than 35 years
        (2) Overweight or underweight prior to pregnancy
        (3) Maternal education less than 11 years
        (4) Family history of inherited disorders
     b. Medical factors
        (1) Cardiac disease
        (2) Pulmonary disease
        (3) Renal disease
        (4) GI disease
        (5) Endocrine disorders, particularly diabetes or thyroid
            disease
        (6) Chronic hypertension
        (7) Hemoglobinopathies
        (8) Seizure or other neurologic disorders
  c. History of present pregnancy/intrapartum factors
     (1) Late or no prenatal care
     (2) Rh sensitization
     (3) Fetus large or SGA
     (4) Premature labor or delivery
     (5) Hypertensive disorders of pregnancy
     (6) Multiple gestation
     (7) Polyhydramnios
     (8) Premature or prolonged rupture of membranes/chorioamnionitis
     (9) Antepartum bleeding
     (10) Abnormal presentation
     (11) Postmaturity
     (12) Abnormal results in fetal testing
     (13) Anemia
     (14) Meconium staining of amniotic fluid
     (15) Abnormal or indeterminate fetal heart rate (FHR)
         tracing
     (16) Administration of maternal opioids shortly prior to birth
  d. Social determinants/psychosocial history
     (1) Financial, housing, or social resources
     (2) Minority status
     (3) Nutritional status/malnutrition
        a. Prepregnant body mass index (BMI)
        b. Weight gain during pregnancy
     (4) Parental occupation
     (5) Significant relationships, marriage status
     (6) Violence or abuse
     (7) Smoking during pregnancy
     (8) Alcohol use during pregnancy
     (9) Drug use/abuse

• Assessment at birth
  1. During and immediately following birth
     a. Answer these 3 questions:
        (1) Is the newborn at term gestation?
        (2) Is the tone good?
        (3) Is the baby breathing or crying?
     b. Gross inspection of anatomy
     c. Place infant on maternal abdomen skin-to-skin (preferred) or
        radiant warmer
     d. Can palpate cord to assess heart rate
  2. Apgar scoring
     a. Scale—0 to 10
        (1) Heart rate—0 = absent, 1 = < 100, 2 = > 100
        (2) Respiratory effort—0 = absent, 1 = slow/irregular,
           2 = strong cry
(3) Tone—0 = flaccid, 1 = flexion of extremities, 2 = active motion
(4) Reflex irritability—0 = no response, 1 = grimace, 2 = strong cry
(5) Color—0 = general cyanosis, 1 = acrocyanosis, 2 = completely pink

b. Assigned at one and five minutes; may be assigned at additional five-minute intervals when prolonged resuscitation efforts are required (traditionally, until > 7)
c. Primary purpose of Apgar score—objective method of quantifying the newborn’s condition and response to resuscitation
d. Poor predictor of long-term outcome
e. Poor reflection of acidaemia
f. Apgar score is not used to determine the need for resuscitation, which resuscitation steps are necessary, or when to use them

  1. Midwives and nurse practitioners who care for women in the intrapartum setting should be trained and certified in neonatal resuscitation; the information presented here is a review, not a substitute for training and certification
  2. Approximately 10% of newborns require some assistance to begin breathing at birth; about 1% require extensive resuscitation
  3. Evaluation is based on three signs
     a. Respirations
     b. Heart rate
c. Color/target preductal peripheral capillary oxygen saturation levels after birth
     (1) One minute: 60–65%
     (2) Two minutes: 65–70%
     (3) Three minutes: 70%–75%
     (4) Four minutes: 75–80%
     (5) Five minutes: 80–85%
     (6) Ten minutes: 85–95%
  4. ABCs of resuscitation
     a. Establish an open Airway
        (1) Position the infant on back or side with the neck slightly extended
        (2) Suction mouth and nose, and trachea as indicated
        (3) Insert endotracheal (ET) tube to ensure open airway if necessary
     b. Initiate Breathing
        (1) Use tactile stimulation to initiate respirations
        (2) Use positive-pressure ventilation (PPV) starting with 21% oxygen (room air) in term newborns
     c. Maintain Circulation—stimulate and maintain circulation with chest compressions and/or medications when necessary
  5. Overview of resuscitation in the delivery room
     a. Initial steps (first 30–60 seconds, “the Golden Minute”)
        (1) Provide warmth
        (2) Position airway
        (3) Clear secretions if necessary
        (4) Dry infant; remove wet linen
        (5) Provide tactile stimulation
     b. Evaluate respirations, heart rate, and color
        (1) If no respirations, or if heart rate less than 100 beats per minute (bpm), initiate PPV with oxygen saturation monitoring within 30–60 seconds, the “Golden Minute”
        (a) If heart rate is below 60 bpm after 30 seconds of effective PPV, continue PPV with endotracheal tube in place and initiate chest compressions; increase oxygen to 100% with chest compressions
        (b) If heart rate is above 60 bpm, continue PPV without chest compressions
     c. Medications
        (1) Medications are initiated when the heart rate remains below 60 bpm after 45 to 60 seconds of coordinated chest compressions and PPV
        (2) Dosage based on estimated infant weight
        (3) Medications include
           (a) Epinephrine—increases strength and rate of cardiac contractions and causes peripheral vasoconstriction
           (b) Volume expanders—recommended solution is normal saline
           (c) Sodium bicarbonate—Rarely used, but may be beneficial in correcting acidosis during prolonged resuscitation
           (d) Naloxone—narcotic antagonist used when there is severe respiratory depression and a history of maternal opioid administration within the last four hours. Do not use if maternal history of long term opioid use
  6. Newborns with meconium-stained amniotic fluid
     a. If the baby has a normal respiratory effort, normal tone, and heart rate greater than 100 bpm, use bulb syringe to clear secretions and meconium from mouth and nose while infant remains with mother; ET suctioning is not indicated
     b. If the baby is not vigorous, as evidenced by depressed respirations, depressed tone, or heart rate less than 100 bpm, positive pressure ventilation should be initiated; routine ET suctioning of meconium is no longer indicated due to lack of evidence to support this practice
  7. Resuscitation of preterm infants at < 35 weeks’ gestation should be initiated with 21–30% oxygen, titrating to preductal oxygen saturation range for healthy term infants; percentage of oxygen to be delivered based on algorithm of infant’s oxygen saturation (as determined by pulse oximeter) for age (in minutes).

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**Care during the First Hours after Birth**

- **Transitional period**
  1. Time when the infant stabilizes and adjusts to extrauterine life
  2. **Three stages**
     a. First period of reactivity
     b. Period of unresponsive sleep
     c. Second period of reactivity
  3. May be altered when the infant is significantly stressed in labor and delivery
  4. Preferred management for first hour of life; some say during hospital stay
     a. Maintain contact with the mother
     b. Limit or defer examinations and procedures, or perform them unobtrusively
Plan of Care for the First Few Days of Life

- **Feeding**
  1. **Demand feeding**
     a. Indicated for both breast- and bottle-fed infants
     b. Most infants will stop sucking and may fall asleep when full and satisfied
  2. **Breastfeeding**
     a. Breastfed infants average 8 to 12 feedings per day
     b. Intake is adequate if the infant seems satisfied and wets four to six diapers per day
     c. Frequent assessment, reassurance, and anticipatory guidance are essential for breastfeeding mothers and infants in the first few days of life
     d. Discourage supplementary bottle-feedings to promote development of maternal and infant breastfeeding skills and to ensure adequate milk supply
  3. **Formula feeding**
     a. Formula-fed infants average six to eight feedings per day
     b. Limited stomach capacity
        (1) Infant may take only 20 to 30 mL of formula at initial feedings
        (2) Most infants should take 60 to 120 mL formula per feeding by the third day of life
     c. Demonstrate positioning and burping techniques

- **Voiding/stooling**
  1. Record time and characteristics of first passage of urine and stool
  2. Stool will progress from meconium to yellow-green
  3. Absence of voiding for 24 hours is an indication for pediatric evaluation

- **Skin**
  1. Full baths and use of antibacterial soap are discouraged
  2. “Dry care”—skin is dried and skin folds are wiped clean with gauze
  3. Warm sponge bath late in first day of life to clear blood and meconium
  4. Discourage use of skin lotions, powders, creams, oils

- **Medications**
  1. Gonorrhea/chlamydia prophylaxis
     a. 0.5% erythromycin ointment
     b. Should be deferred until after the first period of reactivity

• **First period of reactivity**
  1. Begins immediately after birth
  2. Lasts approximately one to two hours
  3. Assessment findings
     a. Rapid heart rate and respirations—near upper limits of normal
     b. Respiratory rales present, disappearing by 20 minutes of age
     c. Behavior—alert; eyes open; may exhibit startle, cry, and/or rooting
     d. Bowel sounds usually present by 30 minutes after birth; may pass stool
  4. Encourage breastfeeding during first period of reactivity
     a. Facilitated by infant's alert, active state
     b. Ameliorates physiologic drop in blood glucose at 1 to 1.5 hours after birth

• **Period of unresponsive sleep**
  1. Lasts from one to four hours after birth
  2. Assessment findings
     a. Heart rate decreases—usually to less than 140 bpm
     b. Murmur may be present because of incomplete closure of ductus arteriosus
     c. Slower, more regular respirations
     d. Bowel sounds present but diminished

• **Second period of reactivity**
  1. Lasts from two to eight hours after birth
  2. Assessment findings
     a. Labile heart rate
     b. Rapid changes in color
     c. Respiration—rate less than 60 breaths/minute without rales or rhonchi
  3. Early feeding
     a. Infant may be interested in feeding during the second period of reactivity
     b. Prevention of hypoglycemia
     c. Stimulation of stool passage
     d. Prevention of jaundice

• **Bonding and parent–newborn attachment**
  1. Definitions vary; generally referring to the process occurring in the time after birth whereby the mother (and/or other family members) form a unique, lasting relationship with the newborn (refer to the section “Normal Postpartum” in Chapter 8 for further detail)
  2. Factors that may influence bonding and attachment
     a. Parental background
        (1) Care that parents received from their parents
        (2) Social/cultural factors
        (3) Couple and family relationships
        (4) Experiences in previous pregnancies
     b. Care practices
        (1) Interventions and assessments before and after birth
        (2) Behavior of healthcare providers
        (3) Care and support received in birthing area
        (4) Institutional rules and policies
  3. Limitations of bonding and attachment theories
     a. Formation of relationships probably evolves out of many experiences rather than a single critical event
     b. Little evidence that early separation has permanent effects on mother–infant or parent–child relationships
     c. May lead to judgmental responses among healthcare providers, or guilt among parents, when bonding expectations are not met
2. Vitamin K
   a. Prevention of hemorrhagic disease
   b. May be administered intramuscularly or orally
3. Hepatitis B vaccination
   a. First dose prior to discharge
   b. Second dose at one to two months of age
   c. Third dose no earlier than 24 weeks of age
4. Health promotion and safety
   1. All caregivers should wash hands thoroughly before handling infant
   2. Follow policies/procedures for infant identification
   3. Follow policies/procedures for infant security
   4. Teaching—safety and signs of illness (see following sections on "Discharge teaching," "Safe sleep environment")

Discharge Planning

• Discharge teaching
  1. Breastfeeding
     a. On demand, at least every two to five hours
     b. Average 8 to 12 feedings every 24 hours
     c. Allow infant to remain on breast until signs of satiety demonstrated
     d. Adequate maternal rest and fluid intake
     e. Sore nipples usually indicate incorrect positioning or latch-on
  2. Formula feeding
     a. Use iron-fortified formula
     b. Clean nipples and bottles thoroughly prior to use
     c. 1.5–4 oz every three to four hours, increasing gradually based on infant cues of hunger/satiety
     d. Supplementary water or juice not recommended
  3. Voiding/stooling
     a. Bottle-fed infant stools—yellow-green, firm to pasty; straining is normal and not necessarily indicative of constipation
     b. Breast-fed infant stools—yellow-gold, loose or liquid, seedy; frequency varies; stooling with each feed or every other day
     c. Typical number of wet and stool diapers in the first seven days of life (U.S. Department of Health and Human Services, 2016)
        (1) Day 1 (first 24 hours after birth): > one wet diaper; one stool (thick, tarry, black)
        (2) Day 2: > two wet diapers; three stools (thick, tarry, black)
        (3) Day 3: > five to six disposable, > six to eight cloth;
          > three stools (transition stools to looser dark green to mustard yellow)
        (4) Day 4: > six wet; > three stools (bright mustard yellow, soft, may be watery)
        (5) Day 5–7: > six wet; > three stools (bright mustard yellow, may be seedy)
  4. Physiologic jaundice
     a. Occurs in more than 50% of newborns
     b. Temporary condition, rarely indicative of disease
     c. Usually peaks at three to four days of life
     d. Yellowing of sclera should be evaluated by pediatric provider
  5. Skin
     a. Sponge bath every day or every other day
     b. Tub baths after cord stump falls off
     c. Mild, unscented soap
     d. Lotions, oils, and powders are unnecessary
     e. Dry/peeling skin is normal and resolves spontaneously
     f. Diaper rash may be treated with petroleum jelly and air exposure, but notify pediatric provider if persistent
  6. Cord care
     a. In developed countries, antiseptic solutions no longer typically applied to cord; keep the area dry
     b. Diaper should be fastened below cord
     c. Avoid immersion of cord stump in water
     d. Cord will usually drop off at approximately two weeks
     e. Redness around the cord base, foul odor, or drainage from cord should be reported to pediatric provider
  7. Safety
     a. Infant car seats for every car ride
     b. Handheld carrier versus body carrier—pros and cons
     c. Bottle propping is dangerous because of choking risk
     d. Avoid handling hot liquids while handling newborn
     e. Avoid exposure to direct sunshine; sunscreens are not necessarily safe for newborns
     f. Install smoke and carbon monoxide detectors
     g. Avoid exposure to cigarette smoke
     h. Safe sleep environment
        (1) Use a firm sleep surface covered by a snug fitted sheet
        (2) Do not use pillows, blankets, sheepskins, or crib bumpers in infant sleep area
        (3) Keep soft objects, toys, loose bedding and sleep positioners out of the infant's sleep area
        (4) Do not smoke or let anyone smoke around the infant.
        (5) Make sure that nothing covers the infant's head
        (6) Always place the infant on his or her back for sleep, for naps and at night
        (7) Dress the infant in sleep clothing, such as a one-piece sleeper, and do not use a blanket
        (8) The infant's sleep area should be near where the parents sleep
        (9) The infant should not sleep in an adult bed, on a couch, or in a chair alone, with parents, or with any other persons
        (10) Instruct all of the infant's care providers to follow these recommendations every time the infant is put to sleep
  8. Expected infant behavior
     a. Hiccups are common and do not require treatment
     b. Sneezing is normal and does not necessarily indicate illness
  9. Signs of illness
     a. Poor feeding, irritability, lethargy, skin rash, cord problems, vomiting, diarrhea, decreased urine output, rectal temperature greater than 100°F, or change in infant's behavior
     b. Emphasize that neonatal infection is not always accompanied by fever
     c. Psychosocial barriers/considerations to discharge
        1. Current maternal substance abuse
2. Present or historical maternal psychiatric illness
3. Severe illness or physical disability of the mother
4. History of abuse or neglect of a previous child
5. Inappropriate maternal behavior
6. Homelessness or inadequate living arrangements

- Physical barriers to discharge
  1. Feedings—newborn must demonstrate adequate intake of human milk or formula prior to discharge

2. Prematurity
   a. Any newborn less than 37 weeks’ gestation or less than 2,500 g should be observed for minimum of three days or in accordance with pediatric/neonatal department policy
   b. Premature infants must demonstrate ability to maintain normal body temperature outside incubator for 24 hours prior to discharge

3. Neonatal abstinence syndrome
   a. Newborn should be held for observation
   b. Social work evaluation and referral to drug treatment, if indicated
   c. Referral to child protective services is indicated if withdrawal symptoms occur or if newborn’s urine toxicology is positive
   d. If medication is required to treat withdrawal, newborn must be held until medication is no longer necessary
   e. Newborn should be asymptomatic for 48 to 72 hours

4. Congenital abnormalities
   a. Heart murmurs suspected to be pathologic should be evaluated prior to discharge
   b. Dislocated hips should be evaluated by orthopedic specialist and treatment begun prior to discharge
   c. Abnormal renal findings on prenatal ultrasound should be evaluated prior to discharge

5. Infections
   a. Sepsis—infants at risk for sepsis should be screened with Rubarth Newborn Scale of Sepsis (Snell & Gardner, 2017); a diagnostic workup would be indicated to help establish diagnosis, although there is no laboratory test that is 100% sensitive and 100% specific; infants determined to be at risk should be treated with antibiotics until blood cultures negative for 48–72 hours
   b. Syphilis—infants with congenital syphilis or infants of mothers with untreated syphilis should receive spinal tap and be treated within 10 days with intramuscular or intravenous penicillin
   c. Pneumonia—infants with pneumonia should be held in hospital for 7 to 14 days for antibiotic treatment

6. Hyperbilirubinemia
   a. Physiologic jaundice
      (1) Not visible in first 24 hours
      (2) Rises slowly and peaks at day 3 or 4 of life
      (3) Total bilirubin peaks at less than 13 mg/dL
      (4) Lab tests reveal predominance of unconjugated (indirect) bilirubin
      (5) Not visible after 10 days
   b. Possible pathologic jaundice
      (1) Visible during first 24 hours
      (2) May rise quickly to greater than 5 mg/dL/24 hours
      (3) Total bilirubin is greater than 13 mg/dL
      (4) Greater amounts of conjugated (direct) bilirubin
      (5) Visible jaundice persists after one week
   c. Labs—serum total bilirubin (STB), blood type, Rh, Coombs
   d. Phototherapy, if indicated, may be arranged through home healthcare agency
   e. Infants with elevated bilirubin but without hemolytic disease may be discharged if outpatient pediatric follow-up can be arranged

- Criteria for early discharge
  1. General criteria
     a. Following uncomplicated birth, most infants may be discharged at 3–24 hours after birth depending on hospital/birth center policy
     b. Joint decision by midwife, pediatric provider, and family
     c. Uncomplicated antepartum, intrapartum, and postpartum course
     d. Early discharge increases importance of patient and family education to assess newborn
     e. Adequate support for mother at home, including home health care referral, if necessary

2. Neonatal criteria
   a. Uncomplicated vaginal delivery
   b. Full-term infant with adequate growth (2,500 to 4,500 g)
   c. Normal findings on neonatal examination
   d. May be minimum six-hour hospitalization but at least sufficient time under provider care to demonstrate
      (1) Thermal homeostasis
      (2) Ability to feed
   e. Normal laboratory results confirmed

3. Maternal criteria
   a. Demonstrated ability with chosen feeding method
   b. Demonstrated ability with cord care
   c. Demonstrated ability to assess newborn’s temperature with thermometer
   d. Verbalizes understanding of signs of newborn well-being and illness

- Discharge evaluation
  1. Complete physical examination with emphasis on the following
     a. Frequency and duration of breastfeedings or frequency and amount of bottle-feedings
     b. Number of voids/stools
     c. Present weight and birthweight
  2. Discharge evaluation should be performed in the presence of parents for teaching, answering questions, and providing anticipatory guidance

- Follow-up care
  1. Pediatric follow-up should be arranged prior to discharge
  2. Factors influencing time of first pediatric visit
     a. Medical condition of newborn
     b. Length of hospital stay
     c. Experience of mother and family in caring for newborns
     d. Size of newborn
     e. Mother/family psychosocial factors
     f. Adequacy of newborn feeding
Newborn Assessment

- History—see the section titled “Immediate Care and Assessment of the Healthy Newborn” earlier in this chapter

- Physical examination

1. General
   a. Whole
      (1) Proportions
      (2) Symmetry
      (3) Facies
      (4) Gestational age (approximate)
   b. Skin
      (1) Color
      (2) Subcutaneous tissue
      (3) Imperfections (bands and birthmarks)
      (4) Vernix and lanugo
      (5) Cysts and masses
   c. Neuromuscular
      (1) Movements
      (2) Responses
      (3) Tone (flexor)

2. Head and neck
   a. Head
      (1) Shape
      (2) Circumference
      (3) Molding
      (4) Swellings
      (5) Depressions
   b. Fontanelles, sutures
      (1) Size
      (2) Tension
   c. Eyes
      (1) Size
      (2) Separation
      (3) Cataracts
   d. Ears
      (1) Placement
      (2) Complexity
      (3) Preauricular tags
   e. Mouth
      (1) Symmetry
      (2) Size
      (3) Clefts
   f. Neck
      (1) Swellings
      (2) Fistulas

3. Chest
   a. Inspect for deformities (nipples, clavicles, sternum)
   b. Observe respiratory function with abdomen
   c. Palpate—breast bud size; clavicle for crepitus and/or swelling

4. Lungs and respiration
   a. Retractions
   b. Grunting
   c. Quality of breath sounds

5. Heart and circulation
   a. Rate
   b. Rhythm
   c. Murmurs—may be present for one to two days after birth until ductus arteriosus closes
   d. Sounds

6. Abdomen
   a. Musculature
   b. Bowel sounds
   c. Cord vessels—number and type
   d. Distension
   e. Scaphoid shape
   f. Masses
   g. Liver edge may be palpable at 2–3 cm below right costal margin
   h. Normal spleen and kidneys are not easily felt
   i. Femoral pulses are felt when the infant is quiet

7. Genitalia and anus
   a. Placement
   b. Identify ambiguous genitalia
   c. Scrotum—size, skin is wrinkled; determine whether testes are descended
   d. Phallus—size, placement of urethra
   e. Labia—palpate for masses; identify all structures and determine patency of vaginal orifice
   f. Anus—determine patency and relative position to other genital structures

8. Musculoskeletal
   a. Posture
   b. Hands—digits; polydactyly, syndactyly, webbing, overlapping, shape and texture; “fisting”
   c. Feet—degree of flexion, shape, position
   d. Neck—rotation
   e. Joints—normal range of motion (ROM)
   f. Long bone fractures—distortion, swelling, crepitus

9. Spine
   a. Symmetry
   b. Scoliosis
   c. Sinuses

- Gestational age assessment

1. Ballard scale (detailed assessment of gestational age)
   a. Estimation of gestational age and maturity based on observation and examination—score total for 40-week infant equals 40
   b. Elements include posture and tone, and characteristics of skin, lanugo, plantar surface, breast tissue, eyes/ears, and genitals

2. Posture and tone—premature infant generally demonstrates extended posture, less tone, and less resistance to flexion of extremities
3. Skin—premature infant has redder/pinker, translucent skin; postmature infant has cracked, wrinkled skin
4. Lanugo is sparse to absent in the postmature or very premature infant and is most abundant in midterm infant (28 to 30 weeks)
5. Plantar surface
   a. Assessed by length of foot from heel to tip of great toe in the premature infant
   b. Creases appear by 28 to 30 weeks of gestation and cover the entire surface at term
6. Breast tissue and areola—progressive development throughout gestation
   a. Preterm—flat areola with no palpable breast bud
   b. Term infant—raised areola with 3- to 4-mm palpable breast bud
7. Eye/ear
   a. Eyelids are fused in very premature neonate
   b. More mature infants exhibit more cartilaginous ear tissue that exhibits greater firmness and recoil when flexed
8. Male genitalia—increasing rugation of scrotum and descent of testes with advancing gestational age
9. Female genitalia—increasing development of labia majora and decreasing prominence of clitoris and labia minora with advancing gestational age
10. Anterior vascular capsule of ocular lens—more prominent vasculature at early gestational ages
• Measurements
1. Weight
   a. Normal weight for a term newborn is 2,501 to 4,000 g
   b. Less-than-normal birthweight—definitions
      (1) Extremely low birthweight—less than 1,000 g
      (2) Very low birthweight—1,001–1,500 g
      (3) Low birthweight—1,501–2,500 g
   c. Usual growth patterns
      (1) Infants typically lose 10% to 15% of birthweight in first three days of life
      (2) Should regain birthweight by 10 to 14 days of age
      (3) Double birthweight by four to six months of age
      (4) Triple birthweight by 12 months of age
2. Length
   a. Most accurately measured by placing head against a firm surface, extending legs, then marking the surface
   b. Normal length for a term newborn is 48 to 53 cm
3. Head circumference
   a. Measured from the occiput around head and above eyebrows
   b. Normal head circumference for a term newborn is 33 to 35 cm
4. Chest circumference
   a. Measured under armpits across nipple line
   b. Normal chest circumference is 30 to 33 cm and 2 to 3 cm less than head circumference
5. Be aware of genetic pool of parents (i.e., one or both of small stature)
• Assess for birth defects
1. Minor malformations are relatively common, but three or more minor malformations on physical examination is suggestive of a major underlying condition
2. Minor malformations
   a. Large fontanelles
   b. Epicanthic eye fold
   c. Hair whorls
   d. Widow’s peak
   e. Low posterior hairline
   f. Preauricular skin tags or pits
   g. Minor ear anomalies—low-set, rotated, protruding
   h. Darwinian tubercule—small nodule on upper helix of ear
   i. Digital anomalies—curved, webbed, or bent fingers
   j. Transverse palmar crease
   k. Shawl scrotum
   l. Redundant umbilicus
   m. Widespread or supernumerary nipples
• Neurologic examination
1. Level of alertness
   a. Most sensitive of all neurologic functions
   b. Varies depending on gestational age, time of last feeding, sleep patterns, recent stimuli, and recent experiences
   c. Findings associated with level of alertness
      (1) Response to arousal attempts (e.g., gentle shaking, sound, light)
      (2) Level and character of motility
2. Neuromotor findings
   a. Tone and posture
   b. Motility and power
   c. Tendon reflexes—brachioradialis, patellar, Achilles
   d. Plantar response—flexion or extension of toes
   e. Eyes—red reflex, pupillary reflex, doll’s eye reflex, blink reflex
3. Assess for normal, absent, diminished, or exaggerated reflexes—abnormal reflexes suggest nervous system depression, spinal lesion, or CNS disorder or lesion
4. Primary neonatal reflexes (Volpe, 2008)
   a. Palmar grasp
      (1) Newborn grasps object or finger placed on his or her palm
      (2) Typically disappears by two months of age
   b. Tonic neck response
      (1) Elicited by rotation of the head to one side
      (2) Newborn extends arm on the side to which the head is rotated and flexes the contralateral arm (“fencing posture”)
      (3) Typically disappears by seven months of age
   c. Moro reflex
      (1) “Startle” response, evidenced by abduction and extension of arms with hands open and thumb and index finger semiflexed to form a C
      (2) Elicited by jarring examination table, allowing the infant to fall backward onto the examiner’s hand, or making a loud noise
      (3) Typically disappears by six months of age
d. Placing and stepping (“walking”)
   (1) Elicited by holding the infant upright and placing soles of feet in contact with flat surface or table edge
   (2) Typically disappears by four weeks of age

• Metabolic screening
  1. No federal guidelines; requirements vary state to state
  2. Metabolic screening tests mandated in most states; the following are examples
     a. Phenylketonuria
     b. Biotinidase deficiency
     c. Congenital adrenal hyperplasia
     d. Congenital hypothyroidism
     e. Cystic fibrosis
     f. Galactosemia
     g. Homocystinuria
     h. Branched-chain ketoaciduria
     i. Sickle cell disease
     j. Tyrosinemia
  3. Timing of metabolic screening
     a. Generally, after 24 hours of age—allowing time for feeding to be established and accumulation of toxic metabolites if disease is present
     b. Preferably 48 to 72 hours of age
     c. Recommended repeat screening at two- to four-week pediatric visit
     d. Law may mandate screening before discharge—for early discharge, repeat screening must be done

3. Timing of metabolic screening

Primary Care of the Newborn for the First Six Weeks

• Well-child surveillance
  1. All newborns should have at least two physical examinations before discharge
  2. Well-child visit
     a. Within three to five days for early discharged newborns
     b. Within 10 to 14 days for newborns held 48 hours
     c. Purpose—reexamine newborn, review teaching, perform metabolic screening
     d. Assessment includes
        (1) Review of maternal, perinatal, and newborn history
        (2) Observation of parents and assessment of family adjustment
        (3) Newborn interval history, including feeding, behavior, voiding/stooling
        (4) Physical examination
     e. Schedule follow-up visits

• Newborn behavior
  1. Sleep–wake states as classified by Brazelton
     a. Quiet sleep
     b. Active sleep
     c. Drowsy

• Sensory capabilities
  1. Sensory threshold—level of tolerance for stimuli within which the infant can respond appropriately
     a. Infant may become fatigued or stressed when overstimulated; signs of stress and fatigue include
        (1) Color changes
        (2) Irregular respiration
        (3) Irritability or lethargy
        (4) Vomiting
     b. Varies significantly among individuals; markedly low in premature or neurologically impaired newborns
  2. Visual capabilities
     a. Normal term infant can visually fix and track objects
     b. Sharp focus limited to distance of 10 to 12 inches
     c. Preference for striped patterns and strong contrasts
     d. Limited color perception
     e. Ability to recognize mother visually and respond to facial expressions within the first few weeks of life
  3. Newborns can detect and discriminate odors
  4. Taste capabilities
     a. Newborns react strongly to variations in taste
     b. Preference for sweets and flavors from maternal diet (prenatal and postnatal flavor learning)
  5. Hearing is acute, with ability to localize sounds and preference for mother’s voice
  6. Touch—sensitive to light touch, as demonstrated by reflex responses

• Regulation of behavior
  1. Ability to respond appropriately to stimuli and maintain behavioral states
  2. Full-term infants should demonstrate smooth transition between states from sleep to active alertness; consistently abrupt or unpredictable changes are a cause for concern
  3. Ability to maintain active alert state varies among individuals—some have difficulty becoming or remaining alert, whereas irritable infants progress rapidly from alertness to crying
4. Overstimulated infants may require timeout, or relative isolation from stimuli and time to recover
5. Organization—ability to integrate physiologic and behavioral systems in response to the environment without disruption in state or physiologic functions
   a. Maintenance of stable vital signs
   b. Smooth state transitions
   c. Coordination of movements and responses in interacting with environment
   d. Consolable with ability for self-consolation (frequently characterized by hand-to-mouth movements)
   e. Habituation—ability to block out noxious stimuli
• Developmental milestones in first six weeks as measured by Denver II
  1. Personal/social skills—spontaneous and responsive smiling, attentiveness to a face
  2. Visual tracking—follows dangling object from midline through 45 degrees
  3. Spontaneous vocalization
  4. Response to sound of bell
  5. Gross motor—lifting head momentarily and symmetrical body movements
• Psychological tasks of early infancy as defined by Erikson
  1. Development of basic trust
     a. Birth through 12 to 18 months
     b. Definition—belief that world is a place where people and things can be relied on and where needs and wishes will be met
     c. Essential for formation of human attachments throughout life
  2. Development of differentiation—ability to discriminate between self and other
  3. Ability to elicit caregiving is essential to early development
  4. Secure attachment depends on caregivers’
     a. Emotional availability
     b. Sensitivity and stimulation
     c. Appropriate response to infant cues
     d. Consistency
  5. In the first year of life, securely attached infants venture out and return to mother
  6. Results of insecure attachment
     a. Anxious or unable to cope with changes or distance from mother
     b. More negative infant behavior
     c. Avoidance/detachment
     d. Research suggests long-term impairment, including school problems and delinquency
  7. Counseling or parenting classes may be helpful when mothers/caregivers are experiencing problems in forming secure attachment
• Circumcision
  1. Increased prevalence in United States during 1950s
  2. Significant role of cultural, religious, and family traditions
  3. Medical complications are rare but serious; include bleeding, infection, and inappropriate operative result
  4. Controversial impact on sexual and psychological functioning; no clear evidence
  5. The American Academy of Pediatrics (2012) has concluded that there is some benefit of reduced sexually transmitted infections (STIs), urinary tract infections (UTIs), and cancer of the penis in men who are circumcised; although the AAP concludes that the evidence for health benefits is not strong enough to recommend routine circumcision for all newborns, the benefits are sufficient enough to ensure access to this procedure for those families who have chosen to have circumcision performed; opponents maintain that modern sanitary conditions and hygienic practices are more important factors underlying those medical conditions that have shown reductions with circumcision; it is important to inform the family members of all known risks and benefits so that they may make an informed, conscious decision
  6. Provide pain control if family chooses circumcision
  7. Care of circumcised infant
     a. Apply petroleum jelly gauze strip to prevent adhesion of tissue to diaper
     b. Continue to use petroleum jelly on affected tissue until healed
     c. Notify care provider if bleeding, exudate, swelling, or inability to void occur
  8. Uncircumcised infant
     a. Foreskin should separate and become freely mobile by four to seven years of age
     b. Never forcefully retract the foreskin
     c. Infant hygiene—“only clean what can be seen”
     d. As the child matures, he should be taught to retract the foreskin and clean
• Non-nutritive sucking
  1. Thumb sucking and use of pacifiers subject to mother/family preferences and attitudes
  2. Common behavior in utero
  3. Infant may use non-nutritive sucking to regulate behavior state or self-console
  4. Avoid
     a. Use of empty bottle for non-nutritive sucking (promotes ingestion of air and dental caries, and may contribute to otitis)
     b. Placing pacifier on string around baby’s neck
     c. Prolonged use of and serious dependence on pacifiers

Common Variations from Normal Newborn Findings
• Jaundice
  1. Incidence—up to 50% of newborns
  2. Physiologic versus pathologic jaundice
     a. Physiologic jaundice does not occur within first 24 hours of life
     b. Total serum bilirubin concentrations increasing by more than 5 mg/dL per day indicate pathologic jaundice
     c. Physiologic jaundice rarely results in total serum bilirubin concentrations greater than 15 mg/dL
     d. Direct serum bilirubin levels greater than 1.5 mg/dL indicate pathologic jaundice
3. More common and slower to resolve in breastfed infants
4. Can be detected by blanching skin of nose, palms, or soles of feet—if jaundiced, skin blanches yellow; inspection can identify jaundice, but it is not accurate in assessing bilirubin levels
   a. Transcutaneous bilirubinometry (TcB) or serum testing
5. Treatment
   a. Supplementation of breastfed infants with oral glucose water is not helpful and may be harmful
   b. Frequent feeding to stimulate GI elimination
   c. Management online algorithm: Bilitool very useful because treatment levels vary depending on age (in hours) of infant and potential risk factors (such as preterm)
      1. Phototherapy: first-line treatment
      2. Exchange transfusion may be indicated
   d. Treatment thresholds are lower at earlier ages (24 to 48 hours after birth)

- Obstructed lacrimal ducts
  1. Incidence—50% of newborns exhibit excessive tearing and mucoid discharge from eyes
  2. Treatment
     a. Massage—apply gentle, firm pressure in a circular motion on the lateral aspect of the nose adjacent to inner canthus of eye
     b. Clear drainage with cotton ball moistened with warm water, proceeding from inner to outer canthus
     c. Repeat treatment three to four times per day

- Dacryocystitis
  1. Definition—acute infection of lacrimal ducts
  2. Presentation—purulent discharge, swelling, tenderness adjacent to inner canthus of eye
  3. Treatment
     a. Same hygiene routine as described for obstructed lacrimal ducts
     b. Aseptic technique to prevent cross-contamination
     c. Topical or systemic antibiotics are indicated

- Skin problems
  1. Cradle cap
     a. Definition—dermatitis resulting from accumulation of sebum on scalp
     b. Presentation—characteristic yellow, crusting patches on anterior scalp, often in area of anterior fontanelle
     c. Treatment
        1. Vigorous cleansing with mild shampoo and washcloth
        2. Apply baby oil to area 30 minutes prior to shampooing
        3. Rub affected area with dry washcloth gently but firmly to remove crusting
        4. If severe, antiseborrheic shampoo may be indicated
  2. Diaper dermatitis
     a. Definition—general term for a variety of skin conditions that can occur in the diaper area
     b. Primary—caused by exposure to moisture and friction
     c. Secondary
        1. Caused by colonization of affected area by pathogen, most commonly Candida albicans

- Thrush
  1. Definition—oral fungal infection usually caused by Candida albicans
  2. Peak incidence around second week of life
  3. Often occurs after antibiotic therapy
  4. Presentation—characteristic white patches on the buccal mucosa, gums, tongue, and/or palate; lesions may be friable
  5. May cause feeding difficulty if extensive
  6. Treatment
     a. Nystatin suspension orally four times a day for one week
     b. Instill one dropper-full into each buccal pocket
     c. “Paint” lesions with cotton-tipped applicator
     d. Bottle-fed infants—boil nipples after use
     e. Breastfed infants—treat mother’s nipples simultaneously with topical antifungal agents (nystatin, miconazole, clotrimazole) or with oral fluconazole, if topical treatment fails

- Regurgitation
  1. Definition—effortless “spitting up” of small amount of formula or breastmilk
  2. Exacerbated by excessive swallowing of air, resulting from underfeeding or delayed feeding and prolonged crying, improper positioning, sucking on empty formula bottle
  3. Treatment
     a. Normal self-limiting condition, no treatment necessary
     b. May be reduced if infant is positioned sitting upright at 50 to 60 degree angle for 30 to 60 minutes after feeding

- Colic
  1. Definition—sudden, loud, and/or continuous unexplained crying often accompanied by flushed facies, mild abdominal distension, adduction of legs, or clenched fists
  2. Affects 10% of infants
  3. No proven organic basis; suggested but unproved causative factors may include
     a. Overfeeding, especially in bottle-fed infants
     b. Allergy to constituents of formula or breastfeeding mother’s diet (milk products often suggested)
c. Anxiety in primary caregiver or tension in household; possibly symptomatic rather than etiologic

d. Immaturity of digestive system

4. Treatment
   a. Attempt to identify factors associated with colic episodes for the individual infant
   b. Correct overfeeding
   c. Trial elimination of milk products from breastfeeding mother’s diet
      (1) Efficacy is unknown; anecdotally effective in many cases
      (2) If bovine allergens are implicated, a trial longer than one week is necessary to clear mother’s system
      (3) Maternal calcium supplementation is suggested with this approach
   d. Some infants respond to warmth, wrapping in a blanket, limitation of stimuli, rhythmic soothing motion, gentle repetitive massage, or soft monotonous music
   e. Probably most important factor is supportive care for parents, including reassurance and respite opportunities
   f. As a last resort for exhausted parents, infant may be positioned safely and left to cry for limited periods of time

Deviations from Normal

• Danger signs of neonatal morbidity

1. CNS signs
   a. Lethargy
   b. High-pitched cry
   c. Jitteriness
   d. Abnormal eye movement
   e. Seizure activity
   f. Abnormal fontanelle size or bulging fontanelles

2. Respiratory signs
   a. Intermittent cessation of breathing for more than 15 seconds, usually accompanied by bradycardia or cyanosis
   b. Tachypnea
   c. Nasal flaring, expiratory grunting, and/or chest retractions
   d. Persistent rales and/or rhonchi
   e. Asynchronous breathing movements

3. Cardiovascular signs
   a. Abnormal rate and rhythm
   b. Murmurs
   c. Changes in blood pressure
   d. Marked differential between upper and lower extremity blood pressure
   e. Alterations and/or differentials in pulses
   f. Changes in perfusion and skin color

4. GI signs
   a. Refusal to feed
   b. Absent or uncoordinated feeding reflexes
   c. Vomiting
   d. Abdominal distension
   e. Changes in stool patterns

5. Genitourinary signs
   a. Hematuria
   b. Absence of urine or failure to pass urine

6. Metabolic alterations
   a. Hypoglycemia
   b. Hypocalcemia
   c. Hyperbilirubinemia and jaundice, especially jaundice occurring within the first 24 hours of life

7. Fluid balance alterations
   a. Decreased urine output
   b. Five percent to 15% weight loss in one day
   c. Dry mucous membranes
   d. Sunken fontanelles
   e. Poor skin turgor
   f. Increased hematocrit

8. Temperature instability
   • Preterm infants
     1. Definition—infants born before 37 completed weeks of gestation
     2. Associated complications
        a. Respiratory complications
        b. Necrotizing enterocolitis
        c. Intraventricular hemorrhage
        d. Hypothermia
        e. Hypoglycemia
        f. Infection
        g. Hyperbilirubinemia
   • SGA infants
     1. Definition—birthweight below 10th percentile
     2. Symmetric growth restriction
        a. Results from early and prolonged insult(s)
        b. Associated with decreased brain size and intellectual disability
        c. Growth restriction continues after birth
     3. Asymmetric growth restriction
        a. Results from insult(s) late in pregnancy
        b. Head circumference is near normal for gestational age
        c. Rapid postnatal growth and development with normal cognitive development
     4. Maternal factors associated with growth restriction
        a. Obstetric—history of infertility, history of abortions, grand multiparity, hypertensive disorders of pregnancy
        b. Medical—heart disease, renal disease, hypertension, sickle cell disease, phenylketonuria, diabetes
        c. Psychosocial—malnutrition, low socioeconomic status, extremes of maternal age, poor prenatal care, substance abuse
• Post-term infants
  1. Definition—born after 42 completed weeks’ gestation
  2. Associated complications
     a. Meconium aspiration
        (1) Physical barrier to gas exchange
        (2) Causes chemical irritation and thickening of the alveolar walls
        (3) Vasoconstriction/vasospasm may cause pulmonary hypertension and persistent fetal circulation
     b. Hypoglycemia
     c. Polycythemia
     d. Hypothermia
  3. Associated maternal and fetal factors
     a. Maternal—primigravid, grand multiparity, previous post-term delivery
     b. Fetal—anencephaly, trisomies
• LGA infants
  1. Definition—birthweight above 90th percentile; sometimes defined as birthweight above 4,000 or 4,500 g
  2. Associated complications
     a. Birth injuries, including fractures and intracranial hemorrhage
     b. Hypoglycemia
     c. Polycythemia
     d. Perinatal asphyxia
  3. Maternal factors associated with excessive fetal growth
     a. Gestational diabetes
     b. Genetic predisposition
     c. Excessive maternal weight gain during pregnancy
  4. Infants of diabetic mothers (IDMs)
     a. Gestational diabetes and hyperglycemia more likely to result in excessive fetal growth (macrosomia)
     b. Chronic or severe maternal diabetes with vascular changes more likely to result in growth restriction
     c. Pregestational diabetes associated with congenital anomalies, including CNS anomalies, congenital heart defects, and tracheoesophageal fistula
• Neonatal infection
  1. Signs of infection in the newborn
     a. Often subtle and nonspecific
     b. Early signs—lethargy, refusal to feed, vomiting, temperature instability
     c. May show subtle changes in color—cyanosis, pallor, mottling
     d. May be related to involved organ system(s)
        (1) CNS infections—jitteriness, seizures
        (2) Pulmonary infections—respiratory distress, apnea
        (3) Intestinal infections—diarrhea
  2. Signs of chronic intrauterine infection
     a. Growth restriction
     b. Microcephaly
     c. Hepatosplenomegaly
  3. Sepsis
     a. Increased susceptibility because of immature immune function
     b. Evaluation includes blood and cerebrospinal fluid (CSF) cultures; complete blood count (CBC) with differential; IgM titer; chest radiograph; toxoplasmosis, rubella, cytomegalovirus (CMV), and herpes screening
  4. Bacterial infections
     a. Group B b-hemolytic streptococcus (GBS)
        (1) Most common pathogen in neonatal infections
        (2) Etiology—maternal colonization, transmitted to neonate during labor and delivery
        (3) Preterm newborns at highest risk
        (4) Early-onset GBS disease—develops within first 24 hours of life; characterized by respiratory involvement; may be fatal
        (5) Late-onset GBS disease—onset usually after second week of life; characterized by CNS involvement; rarely fatal but may result in permanent neurologic damage
     b. Listeria
        (1) Presentation—diffuse papular rash on trunk and pharynx, respiratory distress, cyanosis, sepsis
        (2) Etiology—maternal colonization, transmitted to neonate during labor and delivery
     c. Escherichia coli
        (1) Major cause of neonatal meningitis and sepsis
        (2) Etiology—maternal colonization, transmitted to neonate during labor and delivery
     d. Neisseria gonorrhoeae
        (1) Pathogenic for ophthalmia neonatorum
        (2) May cause blindness if untreated
        (3) Prophylaxis—administration of silver nitrate or erythromycin ointment to eyes after birth
        (4) May invade joint capsules, causing septic arthritis, although this is rare
     e. Tuberculosis
        (1) Congenital disease is rare unless mother has untreated, advanced disease
        (2) Primarily affects newborn liver when acquired before birth
        (3) Separation of newborn from mother is unnecessary if mother has negative chest radiograph, has negative sputum culture, and is receiving treatment
  5. Viral and protozoal infections
     a. Toxoplasmosis
        (1) Associated with raw meat and infected feces, especially cat
        (2) Mother is often asymptomatic
        (3) Signs of infection in the newborn include microcephaly, cerebral calcifications, chorioretinitis, hepatosplenomegaly, and jaundice
        (4) Treatment limits further disease but does not correct damage to CNS
     b. Syphilis
        (1) Signs of infection in the newborn include intrauterine growth restriction (IUGR), ascites, rhinitis, jaundice, anemia
        (2) Spontaneous abortion, stillbirth, or newborn demise occurs in 40% of cases when mother is untreated; another 40% result in congenital syphilis
        (3) Congenital syphilis may result in multisystem organ damage and/or death
c. Rubella
   (1) Infection in utero may result in IUGR, cardiac anomalies, deafness, blindness, and/or intellectual disability
   (2) Effects depend on gestational age at transmission and duration of infection

d. CMV
   (1) No effective means of treatment or prevention
   (2) Effects of congenital CMV infection—30% incidence of death in infancy, 90% of survivors have CNS, visual, and/or auditory damage

e. Herpes
   (1) Transmission typically occurs during intrapartum period; prenatal infection is rare
   (2) Newborns are susceptible to systemic disease, which may involve hepatitis, pneumonia, encephalitis, and/or disseminated intravascular coagulopathy
   (3) Primary maternal infection is associated with 50% newborn mortality rate and high rates of permanent neurologic damage
   (4) Recurrent maternal infection rarely results in severe systemic disease

f. Hepatitis B
   (1) Often results in prematurity and low birthweight
   (2) Onset of disease occurs four to six weeks after birth and is marked by poor feeding, jaundice, and hepatomegaly
   (3) Most infants infected perinatally demonstrate carrier state without acute disease

g. Chlamydia
   (1) Most common cause of blindness worldwide
   (2) Intrapartum transmission may result in conjunctivitis, pneumonia, and/or otitis media
   (3) Chlamydial conjunctivitis is not prevented by ocular administration of silver nitrate; erythromycin ophthalmic ointment is preferred

h. Human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS)
   (1) Maternal antiretroviral therapy during pregnancy dramatically reduces vertical transmission; cesarean section prior to the start of labor is recommended for all women with a viral load ≥ 1,000 copies/mL to further reduce risk of vertical transmission
   (2) Can be transmitted via breastfeeding
   (3) May result in prematurity, growth restriction, and/or microcephaly
   (4) Opportunistic infection usually manifests within the first months of life

i. Zika (www.cdc.gov/zika)
   (1) Prevention—protection from mosquito bites and sexual transmission; avoid travel to areas where prevalent; if client has traveled to endemic area, testing in first and second trimesters advised even if not symptomatic
   (2) May result in microcephaly, neurological problems in infant (full extent remains unknown)

- Plexus injuries—prognosis is good; 88–92% of affected infants recover fully within first year of life
  1. Thought to result from lateral traction on shoulder or head during delivery; some evidence of intrauterine effect also exists
  2. Erb’s palsy
     a. Accounts for 90% of all plexus injuries
     b. Involves upper part of the plexus (C5 through C7 and occasionally C4)
     c. Shoulder and upper arm are affected
     d. Decreased biceps reflex is present
     e. When C4 is involved, diaphragmatic dysfunction is present
  3. Total palsy
     a. Accounts for 8–9% of all plexus injuries
     b. Diffuse plexus involvement (C5 to T1)
     c. Upper arm, lower arm, and hand are affected
     d. Biceps and triceps reflexes are decreased
  4. Klumpke paralysis
     a. Accounts for less than 2% of all plexus injuries
     b. Involves C8 to T1
     c. Lower arm and hand are affected
  5. Associated injuries—clavicle fracture, humerus fracture, shoulder dislocation, facial nerve injury
  6. Management usually consists initially of limiting movement of the affected extremity, and then gradual introduction of gentle ROM exercises

- Neonatal fractures
  1. Fracture of the clavicle—not a significant newborn fracture
     a. Most common neonatal fracture
     b. Signs—hematoma, crepitus, asymmetric tone/movement of upper extremities
     c. Sometimes associated with plexus injuries
  2. Fracture of humerus or femur—significant fractures, may be nosocomial
     a. Rare; usually associated with breech deliveries
     b. Ecchymosis, hematoma, or hemorrhage may occur at fracture site
    3. Skull fracture
     a. Rare; may be associated with forceps delivery
     b. Linear fracture—usually benign, resolves without treatment
     c. Depressed fracture—may be associated with seizures and/or permanent neurologic injury
     d. Signs—cephalohematoma, palpable depression in bone

- Infants with hemolytic disease
  1. Definition—destruction of RBCs, resulting in hyperbilirubinemia and jaundice
  2. Causes—maternal antibodies, enzymatic disorders, infections
  3. Rh incompatibility
     a. Occurs when mother is Rh negative and fetus is Rh positive
     b. Positive result on direct Coombs’s test indicates presence of maternal antibodies
     c. May necessitate exchange transfusion
  4. ABO incompatibility
     a. Occurs when mother is serologic type O and fetus is type A or B; infrequently when mother is type A and fetus is type B
     b. Very rare incidence of hydrops or stillbirth
     c. May result in neonatal jaundice; rarely causes severe hemolysis or anemia
• Hyperbilirubinemia and severe jaundice
  1. Associated with many neonatal complications, including hemolytic disease, prematurity, impaired hepatic function, sepsis, metabolic disorders, hematomas, impaired intestinal function, and others

2. Kernicterus
   a. Encephalopathy caused by deposition of bilirubin in brain cells
   b. Classic signs—lethargy, diminished reflexes, hypotonia, and seizures
   c. Contributing factors— prematurity, hypothermia, asphyxia, acidosis, sepsis
   d. Complications include hearing impairment, cerebral palsy, and intellectual disability

3. Phototherapy
   a. Oxidizes unconjugated bilirubin in the skin, rendering it water soluble and facilitating elimination
   b. Precautions
      (1) Protect infant’s eyes from high-intensity light
      (2) Monitor fluid status and temperature

• Infants affected by maternal substance abuse
  1. Fetal alcohol spectrum disorders (FASDs)— alcohol use in pregnancy can cause FASDs in neonate; FASDs are physical, behavioral, and intellectual disabilities that last a lifetime; up to one in 20 U.S. schoolchildren may have FASD
   a. Fetal/neonatal effects—microcephaly, facial abnormalities, cardiac defects, malformation of joints, failure to thrive, intellectual disability
   b. May result in withdrawal syndrome in the neonate; characterized by irritability, tremors, tachypnea, tachycardia, poor feeding

2. Cocaine abuse
   a. Fetal/neonatal effects— prematurity, low birthweight, IUGR, genitourinary abnormalities, seizures, congenital heart disease, irritability, frantic or poor feeding
   b. May result in long-term behavioral impairment

3. Opiate abuse
   a. Minimal long-term effects compared to cocaine and alcohol; primarily affects immediate neonatal period
   b. Abstinence syndrome (opiate withdrawal)
      (1) Onset shortly after birth
      (2) CNS signs—irritability, tremors, high-pitched cry, hyper-stimulability, possible seizure activity
      (3) Other signs—tachypnea, tachycardia, poor or disorganized feeding, hyperthermia, vasomotor instability
      (4) Care is primarily supportive, although methadone or buprenorphine may be necessary with severe symptoms

4. Marijuana abuse
   a. Little or no evidence for teratogenic effects
   b. Possible newborn behavioral effects—fine tremor, prolonged startle response, irritability, poor habituation to visual stimuli
   c. No behavioral effects demonstrated to persist beyond infancy

5. Prescription drugs of abuse potential
   a. Amphetamines
      (1) Fetal/neonatal effects— genitourinary, cardiac, and/or CNS abnormalities; behavioral state disorganization
      (2) May result in long-term learning disabilities
   b. Benzodiazepines—fetal/neonatal effects include hypotonia, hypothermia, low Apgar scores, respiratory depression, poor feeding; possible association with midline cleft defects

• Congenital anomalies
  1. CNS anomalies
   a. Spina bifida occulta
      (1) Absent or incomplete closure of one or more vertebral arches
      (2) Dimple or hair tuft may be present over site
      (3) Often asymptomatic without requiring treatment
   b. Meningocele/myelomeningocele
      (1) Meningocele—extrusion of meninges and CSF through defect in vertebral column
      (2) Myelomeningocele—meningocele with extrusion of spinal cord
      (3) Surgical repair is necessary to prevent rupture and infection
      (4) Myelomeningocele results in loss of sensory and motor function below the level of the defect
   c. Anencephaly
      (1) Congenital absence of cranial vault and underlying brain tissue
      (2) Newborn may manifest heart rate and respiration but will die within a few hours after birth
   d. Hydrocephalus
      (1) Abnormal accumulation of CSF in ventricles of the brain
      (2) Signs—increased head circumference, separation of cranial sutures, bulging tense fontanelles, high-pitched cry, and downward deviation of eyes (“setting sun sign”)
      (3) Surgical treatment involves placement of a shunt to drain excess fluid

2. Respiratory anomalies
   a. Choanal atresia
      (1) Definition—congenital blockage of posterior nasal passages
      (2) Respiratory distress is evident at birth if both nares are blocked
      (3) Treatment includes respiratory support and surgical repair
   b. Diaphragmatic hernia
      (1) Definition—defect of diaphragm, allowing herniation of abdominal contents into thoracic cavity and displacement of heart and lung tissue
      (2) Presentation—respiratory distress and scaphoid abdomen apparent at birth
      (3) Treatment is surgical repair
   c. Pulmonary hypoplasia/agenesis
      (1) Definition—underdevelopment or absence of one or both lungs
      (2) Strong association with other anomalies
      (3) Rare condition with high mortality rate
      (4) Presentation—acute respiratory distress with thoracic asymmetry

3. Cardiovascular anomalies
   a. Anomalies resulting in increased pulmonary blood flow
      (1) Atrial septal defect, ventricular septal defect, patent ductus arteriosus, and atrioventricular canal defect
Gastroschisis
Presentation—asymmetry of gluteal folds, positive Ortolani sign
Repaired surgically, with good prognosis

Pyloric stenosis
Definition—congenital opening of the pylorus, occurring on the dorsum of the stomach
Affects males three to four times more often than females

Definition—congenital deformity of the ankle and foot
Repaired surgically; often complicated by associated genitourinary anomalies

Hypospadias
Definition—anomalies of the external genitalia precluding urinary function
Surgical repair required
Often associated with other genitourinary anomalies

Cleft lip and palate
Definition—incomplete fusion of lip and palate during prenatal development
(1) Definition—incomplete fusion of lip and palate during prenatal development
(2) May interfere with feeding and weight gain
(3) Surgical repair usually results in good cosmetic and functional results

Esophageal atresia and tracheoesophageal fistula
Definition—abnormal development of trachea and esophagus, resulting in “blind pouch” esophagus and/or communication between the two structures
(1) Transposition of the great vessels—aorta arises from right ventricle and pulmonary artery arises from left ventricle, resulting in circulatory bypass of lungs and circulation of unoxygenated blood to the body
(2) Truncus arteriosus—failure of embryonic structure to divide into aorta and pulmonary artery

4. GI anomalies
a. Cleft lip and palate
(1) Definition—incomplete fusion of lip and palate during prenatal development
(2) May interfere with feeding and weight gain
(3) Surgical repair usually results in good cosmetic and functional results

b. Esophageal atresia and tracheoesophageal fistula
(1) Definition—abnormal development of trachea and esophagus, resulting in “blind pouch” esophagus and/or communication between the two structures
(2) Presentation—copious drooling, poor feeding with reflux, acute respiratory distress and cyanosis with feeding
(3) Repaired surgically, with good prognosis

C. pyloric stenosis
Definition—obstruction of pylorus (distal opening of stomach)
(1) Definition—obstruction of pylorus (distal opening of stomach)
(2) Affects males three to four times more often than females
(3) Presentation—vomiting, visible gastric peristalsis, constipation
(4) Repaired surgically, with good prognosis

d. Omphalocele
Definition—defect of abdominal wall with herniation of abdominal viscera through umbilical ring
(1) Definition—defect of abdominal wall with herniation of abdominal viscera through umbilical ring
(2) Protruding abdominal viscera usually covered by membrane
(3) Frequently associated with other anomalies
(4) Repaired surgically; prognosis depends on extent of lesion and nature and extent of associated anomalies

5. Genitourinary anomalies
a. Hypospadias
(1) Definition—in males, urethral opening is located on ventral aspect of penis
(2) Circumcision contraindicated—foreskin tissue is often used in surgical repair
(3) Rare in females, with urethral opening located in the vagina

b. Epispadias
(1) Definition—congenital opening of urethra on dorsum of penis
(2) Often associated with other genitourinary anomalies
(3) Repaired surgically

c. Ambiguous genitalia
(1) Definition—anomalies of the external genitalia precluding identification of the newborn’s sex
(2) May be associated with anomalies of the internal genitalia
(3) Chromosome studies can determine genotypic sex
(4) Gender identity problems are frequent; reconstructive surgery is controversial

d. Extrophy of the bladder
(1) Definition—exposure of bladder outside the abdominal wall
(2) Repaired surgically; often complicated by associated genitourinary anomalies

e. Patent urachus
(1) Definition—persistence of fetal opening between bladder and umbilical cord
(2) Repaired surgically

6. Musculoskeletal anomalies
a. Congenital hip dysplasia
(1) Definition—abnormal development of the acetabulum, resulting in dislocation of femoral head
(2) Definition—abnormal development of the acetabulum, resulting in dislocation of femoral head
(3) Treatment—reduction and stabilization of femoral head into acetabulum to allow development of stable hip capsule
(4) Stabilization is accomplished by use of Frejka pillow or Pavlik harness

b. Talipes equinovarus
(1) Definition—congenital deformity of ankle and foot
(2) Orthopedic treatment involves application of splints or successive plaster casts to correct position of foot and allow normal development
(3) Success of treatment depends on early treatment; with early treatment, prognosis is good

Gastrochisis
Definition—defect of abdominal wall and evisceration of abdominal organs
(2) Rarely associated with other anomalies
(3) Management at birth—cover eviscerated organs with sterile gauze moistened with sterile saline solution
(4) No oral intake until after repair; IV therapy for fluid and electrolyte maintenance
(5) Repair may require several surgeries; prognosis depends on extent of lesion
7. Chromosomal abnormalities
   a. Down syndrome
      (1) Results from extra chromosome at pair 21
      (2) Signs include close-set, slanting eyes; narrow palpebral fissures; flattened nose; large, protuberant tongue; short, thick fingers with incurring of fifth digit; simian palmar crease; nuchal thickening
      (3) Involves varying degrees of intellectual impairment
      (4) Associated with multiple congenital anomalies, including cardiac and GI tract defects
   b. Trisomies 13 and 18
      (1) Clinically similar to but more severe than Down syndrome
      (2) High mortality rates; poor life expectancy
8. Inborn errors of metabolism
   a. Phenylketonuria
      (1) Definition—deficiency of phenylalanine hydroxylase, resulting in inability to metabolize phenylalanine
      (2) Results in toxic accumulation of abnormal metabolites of phenylalanine, eventually leading to CNS damage
      (3) Treatment—dietary restriction of foods high in phenylalanine
      (4) Should be identified and treated before three weeks of age
   b. Galactosemia
      (1) Definition—inability to convert galactose to glucose
      (2) Results in toxic accumulation of galactose in the bloodstream
      (3) Treatment—dietary restriction of foods containing galactose
   Sudden infant death syndrome (SIDS)
   1. Definition—sudden unexplained death of infant between birth and one year of age

Questions

Select the best answer.

1. Which of the following infants is least at risk for neonatal hypoglycemia?
   a. The infant of a mother with diabetes mellitus
   b. The infant of a mother with gestational diabetes
   c. An infant who had intrapartum fetal monitoring findings suggestive of perinatal acidaemia
   d. The infant of an opioid-abusing mother
2. Which of the following best describes the appearance and behavior of an overstimulated infant?
   a. Tremors, tachycardia, non-nutritive sucking, nasal flaring, and grunting
   b. Color changes, irregular respiration, irritability or lethargy, and vomiting
   c. Lethargy, flaccid tone, pallor, and inability to maintain alert active state
   d. Habituation to noxious stimuli and attempts to self-console
3. The midwife performs a physical examination on a newborn two hours after birth. Which of the following findings indicates a need for pediatric consultation?
   a. Respiratory rate of 50 breaths per minute
   b. Intermittent episodes of apnea, lasting less than 10 seconds each
   c. Yellow blanching of skin when pressure is applied to the infant's nose
   d. Preauricular skin tag
4. Ms. G. has just given birth, and the midwife's initial impression is that resuscitation may be necessary. The infant is limp, blue and not crying. According to American Academy of Pediatrics (AAP) and American Heart Association (AHA) guidelines, the midwife's initial steps are, in sequential order:
   a. Place the infant under a radiant heater, dry the infant and remove wet linen, suction the mouth and nose, and provide tactile stimulation while assessing for the presence or absence of spontaneous respirations.
   b. Place the infant under a radiant heater, suction the mouth and nose, and evaluate heart rate by palpating the base of the umbilical cord or femoral pulse.
   c. Place the infant under a radiant heater, evaluate heart rate by palpating the base of the umbilical cord or femoral pulse, dry the infant and remove wet linen, suction the mouth and nose, and continue to provide tactile stimulation.
10. Ms. H., who has a one-month-old infant, contacts the midwife on call. Ms. H. sounds distraught and tells the midwife that her baby “just cries and cries, all the time, and cries so hard that he gets red in the face. He's starting to drive me crazy!” The midwife asks questions about the baby's temperature, feeding habits, and voiding and stooling, all of which appear to be normal despite the baby's behavior. The midwife correctly tells Ms. H. that:
   a. she should take the baby to the emergency room immediately.
   b. the baby's behavior is normal, and getting used to the demands of an infant is a normal part of adjusting to motherhood.
   c. some babies are prone to this behavior, and one of the biggest problems is the effect on the baby's parents—when it gets to be too much, position the baby safely in his crib and go outside for a “sanity break.”
   d. the baby's problem results from lack of stimulation—put on some upbeat music, turn on all the lights, make sure he can move freely, and engage him in active play.

11. At her six-month well-child checkup, Ms. J’s baby weighs 12 lb, compared to a birthweight of 6 lb. Ms. J. says that she seems to breastfeed well but frequently spits up afterward. The midwife:
   a. obtains a consultation with the pediatrician.
   b. recommends supplementation of formula in addition to continuing breastfeeding.
   c. orders metabolic screening, including screening for phenylketonuria.
   d. reassures Ms. J. that the baby's weight gain is normal and reinforces her breastfeeding technique.

12. Which of the following is not characteristic of normal newborn behavior states?
   a. Abrupt, unpredictable changes between Brazelton's sleep–wake states
   b. Difficulty becoming and remaining alert
   c. Irritability and rapid progression from alertness to crying
   d. Overstimulation, requiring timeout, that is, limitation of stimuli

13. The midwife wishes to estimate a newborn's gestational age. Which standard instrument is appropriate?
   a. Denver II
   b. New Ballard
   c. Erikson
   d. Erb-Duchene

14. Which of the following statements about the major psychological tasks of early infancy is false?
   a. Secure attachment is facilitated by caregivers who demonstrate predictable responses and emotional availability.
   b. The development of basic trust is essential for formation of relationships later in life.
   c. Research has not been able to demonstrate any long-term effects of insecure attachment in early infancy.
   d. A major issue is the infant's ability to elicit caregiving responses from his or her mother.

15. The midwife's discussion about circumcision with the infant's parents should acknowledge that:
   a. there are no medical benefits to circumcision.
   b. the risks of circumcision, while rare, are potentially serious.
   c. research has proven that circumcision has a negative impact on long-term psychological and sexual functioning.
   d. although there may be some modest benefit in reducing potential urinary tract and sexually transmitted infections, decisions about circumcision are largely based on personal, cultural, and religious considerations.
16. Which of the following statements about hemolytic disease is true?
   a. ABO incompatibility is most common when the maternal blood type is A and the fetus's blood type is B.
   b. Rh incompatibility may result in neonatal jaundice but rarely causes severe hemolysis or anemia.
   c. A positive result on the direct Coombs's test indicates the presence of fetal blood cells in maternal circulation.
   d. Hemolytic disease in the infant can be caused by maternal antibodies, enzymatic disorders, and some infections.

17. The midwife suspects maternal opiate abuse as a result of which of the following clusters of newborn signs and conditions?
   a. Prematurity, low birthweight, genitourinary abnormalities, congenital heart disease, irritability, and fractic ineffective sucking
   b. Irritability, tremors, high-pitched cry, hyperstimulability, tachypnea, tachycardia, disorganized feeding, hyperthermia, and vasomotor instability
   c. Microcephaly, facial abnormalities, cardiac defects, and malformation of joints
   d. Lethargy, diminished reflexes, and hypotonia

18. Which of the following assessment findings are most consistent with prematurity?
   a. Translucent skin; sparse lanugo; flat areolae; prominent clitoris and labia minora; and highly flexible, nonrecoiling ear tissue
   b. Scant rugation of scrotum; undescended testes; and wrinkled, cracked, peeling skin
   c. Extended posture, flaccid tone, little resistance to flexion of extremities, and increased recoil of ear tissue
   d. Abundant lanugo, flexed posture, skin creases covering entire plantar surface, and relatively low-set position of ears

19. Prominent vasculature of the anterior lens capsule is most suggestive of which condition?
   a. Herpes virus exposure in the intrapartum period
   b. Relatively immature gestational age
   c. Gonococcal or chlamydial conjunctivitis
   d. Elevated total serum bilirubin concentration

20. Compared to fetal circulation, which of the following is not characteristic of circulation after birth?
   a. Increased pressure in the left atrium that facilitates closure of the foramen ovale
   b. Relatively low pulmonary vascular resistance that results in increased circulation to the lungs
   c. Decreased systemic vascular resistance due to loss of high-resistance placental circuit
   d. Increased oxygenation of circulating blood that causes constriction of the ductus arteriosus

21. Mr. N. is concerned about Ms. N's positive tuberculosis screening result. While awaiting results from Ms. N's chest radiograph and sputum culture, the midwife tells Mr. N. that:
   a. even if the chest radiograph is negative, Ms. N's exposure will necessitate a period of isolation from the newborn that may interfere with the initiation of breastfeeding.
   b. congenital tuberculosis is unlikely to be a problem for the newborn because Ms. N. shows no signs of active disease.
   c. if the newborn acquires tuberculosis in utero, the most serious risk is for respiratory problems in the neonatal period.
   d. subclinical maternal tuberculosis infection is associated with a number of congenital malformations.

22. Which of the following newborn assessment findings is(are) least likely to be related to maternal gestational diabetes?
   a. High-pitched cry, plethora, tachypnea, and inconstancy
   b. Weak cry, jitteriness, cyanosis, apnea, poor feeding, and lethargy
   c. Serum glucose level below 40 mg/dL
   d. Absent Moro reflex on right side, and palpable crepitus between the right shoulder and neck

23. A defect in the vertebral column that results in extrusion of meninges and cerebrospinal fluid is best described as:
   a. spina bifida occulta
   b. hydrocephaly
   c. myelomeningocele
   d. meningoccele

24. Which of the following conditions is most likely to result in loss of sensory and motor function below the level of the defect?
   a. Spina bifida occulta
   b. Hydrocephaly
   c. Myelomeningocele
   d. Meningoccele

25. The midwife notices that Ms. O’s baby, within the first day of life, drools copiously, feeds poorly with excessive reflux, and turns bluish-gray while feeding. Which condition does the midwife suspect?
   a. Tracheoesophageal malformation
   b. Pyloric stenosis
   c. Gastrochisis
   d. Ommphalocele

26. Increased oxygen consumption, hypoglycemia, hypoxia, acidosis, and respiratory distress can be caused in the immediate newborn period by:
   a. congenital bacterial infections
   b. maternal opioid abuse
   c. patent ductus arteriosus
   d. cold stress in the birthing room

27. Relatively mature capabilities of the newborn's gastrointestinal system include:
   a. suckling, swallowing, and gag reflex
   b. ability to digest fats and proteins
   c. absorption of complex sugars
   d. cardiac sphincter tone

28. At one minute of age, Baby P exhibits a strong cry, some flexion of the arms and legs, heart rate of 136 beats per minute, and acrocyanosis. Baby P’s one-minute Apgar score is:
   a. 6
   b. 7
   c. 8
   d. 9

29. At five minutes of age, Baby Q exhibits slow irregular respirations, some flexion of extremities, heart rate of 96 beats per minute, grime in response to suction, and generalized cyanosis. Baby Q's five-minute Apgar score is:
   a. 4
   b. 5
   c. 6
   d. 7
30. Which of the following statements about Apgar scores is true?
   a. The infant's Apgar score indicates whether or not resuscitation is needed and which steps of resuscitation procedure should be initiated.
   b. The one-minute Apgar score is more predictive of cord pH and long-term outcome than is the five-minute Apgar score.
   c. The five-minute Apgar score is more predictive of cord pH, whereas the one-minute Apgar score is more predictive of long-term outcome.
   d. The Apgar score is only useful as a systematic way to assess the newborn's immediate adaptation to extrauterine life.

31. In the initial examination of a male infant, the midwife notes drainage of urine from the stump of the umbilical cord. The newborn's condition is most likely:
   a. patent urachus.
   b. epispadias.
   c. hypospadias.
   d. exstrophy of the bladder.

32. Which of the following is a false statement about the newborn's first breaths?
   a. The first inhalation requires less ventilatory pressure than later breaths.
   b. The first breaths trigger the conversion from fetal to extrauterine circulation.
   c. Initial breathing serves to clear the lungs of fluid.
   d. The first breaths establish lung volume and expand the alveoli.

33. Which of the following is a true statement about thermoregulation in the transitional period?
   a. Shivering and muscular activity are the newborn's most effective means of thermogenesis.
   b. Convection, conduction, radiation, and evaporation are important thermoregulatory mechanisms in the newborn period.
   c. Metabolism of BAT is limited as a means of thermoregulation.
   d. Alkalosis is a potentially serious consequence of ineffective thermoregulation in the newborn.

34. Patient education about newborn skin care includes which of the following?
   a. Cradle cap, a crusty yellowish-white accumulation on the anterior scalp, is caused by Candida albicans and must be treated with a topical antifungal agent.
   b. Dry or peeling skin can be treated with baby oil, but if the condition does not resolve quickly, the healthcare provider should be notified.
   c. Primary diaper dermatitis, characterized by circumscribed areas of bright red erythema and smaller outlying lesions, can be treated with thorough cleaning, baby powder, and air exposure.
   d. Tub baths should be avoided for the first two weeks of life or so until the cord stump has fallen off.

35. Which of the following newborns is not a candidate for early discharge?
   a. Metabolic screening tests have not been completed; the baby has an appointment with the pediatric provider in two days.
   b. Congenital hip dislocation is suspected; the baby has an orthopedic appointment in two weeks for evaluation and treatment.
   c. The infant's birthweight was 2,625 g; gestational age assessment indicates term infant.
   d. The infant requires phototherapy; a home health agency referral has been made.

36. The midwife is examining Baby S prior to discharge. She notes that the head circumference is 34 cm, while the chest circumference is 31 cm. The midwife should:
   a. assess for further signs of hydrocephalus, including separation of cranial sutures, bulging fontanelles, high-pitched cry, and downward deviation of the eyes.
   b. repeat the measurements—these findings are extremely unlikely.
   c. suspect diaphragmatic hernia—measurement of abdominal circumference and location of heart, lung, and bowel sounds may give some indication.
   d. proceed to the next component of the examination without further investigation of these findings.

37. Evaluation of the newborn begins:
   a. before the infant is born.
   b. when the presenting part is crowning.
   c. at the moment of birth.
   d. after initial stabilization and resuscitation, if necessary.

38. Which of the following statements is true of SGA infants?
   a. Symmetric growth restriction results from chronic conditions and is typically associated with catch-up growth and good long-term outcome.
   b. An infant is considered SGAe if he or she weighs less than 1,500 g at birth.
   c. An infant with head circumference above the 45th percentile and birthweight below the 10th percentile for gestational age would be described as asymmetrically growth restricted.
   d. Asymmetric growth restriction is associated with acute insults in late pregnancy and is associated with poor long-term outcome.

39. Baby U has the most abundant lanugo the midwife has ever seen. Baby U’s gestational age is probably:
   a. 24 to 26 weeks.
   b. 26 to 28 weeks.
   c. 32 to 34 weeks.
   d. 36 to 38 weeks.

40. Which of the following is not associated with microcephaly?
   a. Prenatally acquired toxoplasmosis
   b. Prenatally acquired hepatitis B
   c. Fetal alcohol spectrum disorders
   d. Prenatally acquired Zika

41. At her six-week postpartum visit, Ms. V. asks her midwife about sudden infant death syndrome (SIDS). In discussing SIDS with Ms. V., the midwife states that:
   a. SIDS almost never occurs after six weeks of age, so her baby is “in the clear.”
   b. SIDS is extremely rare, affecting less than two in 100,000 infants.
   c. the exact cause of SIDS is unknown.
   d. infants should be put to sleep in a prone or side-lying position.

42. The normal newborn's sensory capacities are most limited in:
   a. color perception.
   b. hearing.
   c. taste sensation.
   d. near vision focus

43. The organized infant is able to:
   a. form significant relationships with others throughout life.
   b. hear high-pitched sounds.
   c. self-console and return to a stable behavioral state.
   d. sleep for 20–25% of daytime hours.
44. Which of the following is true about newborn metabolic disorders?
   a. Federal law mandates testing for phenylketonuria, galactosemia, and cystic fibrosis.
   b. For early-discharge neonates, screening at eight hours of life is acceptably reliable.
   c. Most are characterized by enzyme deficiency, resulting in toxic accumulation of metabolites.
   d. Breastfeeding is strongly recommended for infants with galactosemia.

45. Which of the following is not an associated combination of intrapartum factor and neonatal finding?
   a. Forceps delivery—cephalohematoma
   b. Vertex presentation—asymmetry of gluteal folds
   c. Shoulder dystocia—asymmetric Moro reflex
   d. Breech presentation—positive Ortolani sign

46. Visible gastric peristalsis on observation of the abdomen is most suggestive of:
   a. pyloric stenosis.
   b. esophageal fistula.
   c. colic.
   d. normal finding.

47. Normal newborn respiratory findings include:
   a. nasal flaring, expiratory grunting, and retractions.
   b. diaphragmatic and abdominal breathing.
   c. respiratory rate 40 to 80 breaths per minute.
   d. ventilation primarily through the mouth.

48. Non-nutritive sucking:
   a. is not known to occur before birth.
   b. should be discouraged to prevent dental and facial malformations.
   c. is an example of behavioral self-regulation.
   d. can be promoted by placing a pacifier on a string around the baby’s neck.

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**Answers with Rationales**

1. d. The infant of an opioid-abusing mother
   The other choices indicate risk factors for neonatal hypoglycemia. Opioid abuse is not a risk factor for hypoglycemia.

2. b. Color changes, irregular respiration, irritability or lethargy, and vomiting
   Infants may become fatigued or stressed when overstimulated. Color changes, irregular respiration, irritability or lethargy, and vomiting can be signs of such stress.

3. c. Yellow blanching of skin when pressure is applied to the infant’s nose
   Jaundice in the first 24 hours of life is a pathologic finding that requires further evaluation and treatment.

4. a. Place the infant under a radiant heater, dry the infant and remove wet linen, suction the mouth and nose, and provide tactile stimulation while assessing for the presence or absence of spontaneous respirations.
   This is the correct sequence of initial steps in neonatal resuscitation, per Neonatal Resuscitation Program (NRP) guidelines.

5. d. evaluates the infant’s color and preductal peripheral oxygen saturation, and provides oxygen only if SPO₂ levels indicate.
   If the infant is crying vigorously, he or she does not require positive-pressure ventilation.

6. c. Suction the mouth, nose, and pharynx only; endotracheal suctioning is not indicated.
   The infant is vigorous and therefore does not require endotracheal intubation. Stimulation is to be avoided until necessary suctioning is performed.

7. a. Rapid changes in the infant’s color during the period from two to six hours after birth are ominous signs and require further evaluation.
   The other choices are true; rapid changes in the infant’s color in the transitional period are not necessarily ominous signs (e.g., Harlequin’s sign is normal).

8. b. “Because I’m bottle-feeding, I’m going to stick to a regular two-hour feeding schedule.”
   Whether breastfed or bottle-fed, infants thrive best when fed on demand in response to cues of hunger.

9. a. Because of the rapid onset of ophthalmia neonatorum, administration of silver nitrate or erythromycin should take priority over family bonding and initiation of breastfeeding.
   There is no increased risk for ophthalmia neonatorum if eye prophylaxis is delayed until after first period of reactivity. Eye contact during this period is considered important in the maternal–infant attachment process.

10. c. Some babies are prone to this behavior, and one of the biggest problems is the effect on the baby’s parents—when it gets to be too much, position the baby safely in his crib and go outside for a “sanity break.”
    Colic affects approximately 10% of infants and can be quite frustrating for parents. Sometimes a short break of stepping out on the porch and breathing fresh air (when assured that the baby is safely in his or her crib) can be restorative and calming for the parent.

11. d. reassures Ms. J. that the baby’s weight gain is normal and reinforces her breastfeeding technique.
    Regurgitation is common in infants. The infant is thriving well and gaining weight appropriately.

12. a. Abrupt, unpredictable changes between Brazelton’s sleep–wake states
    Abrupt, unpredictable changes between Brazelton’s sleep–wake states are not characteristic of normal newborn behavior.

13. b. New Ballard
    The New Ballard instrument is the only one of the choices that estimates a newborn’s gestational age.

14. c. Research has not been able to demonstrate any long-term effects of insecure attachment in early infancy.
Research suggests that long-term impairment, including school problems and delinquency, can result from insecure attachment in early infancy.

15. d. although there may be some modest benefit in reducing potential urinary tract and sexually transmitted infections, decisions about circumcision are largely based on personal, cultural, and religious considerations. It appears that there is some benefit of reduced STIs, UTIs, and cancer of the penis in men who are circumcised, but opponents maintain that modern sanitary conditions and hygienic practices are more important factors in reducing the incidence of these diseases in comparison to the benefits from circumcision.

16. d. Hemolytic disease in the infant can be caused by maternal antibodies, enzymatic disorders, and some infections. Hemolytic disease can be caused by maternal antibodies, enzymatic disorders, or infections.

17. b. Irritability, tremors, high-pitched cry, hyperstimulability, tachypnea, tachycardia, disorganized feeding, hyperthermia, and vasomotor instability

Irritability, tremors, high-pitched cry, hyperstimulability, tachypnea, tachycardia, disorganized feeding, hyperthermia, and vasomotor instability are all signs of abstinence syndrome (opiate withdrawal) in the neonate.

18. a. Translucent skin, sparse lanugo, flat areolae, prominent clitoris and labia minora, and highly flexible, nonrecoiling ear tissue

Answer choices b, c, and d offer conflicting findings regarding gestational age assessment. Only answer choice a lists all of the features that are consistent with prematurity.

19. b. Relatively immature gestational age

The vasculature of the anterior capsule of the ocular lens is more prominent with early gestational ages.

20. c. Decreased systemic vascular resistance due to loss of high-resistance placental circuit

The placental circuit is low resistance, and the opposite is true after birth, when there is increased systemic vascular resistance with the loss of the placental circuit.

21. b. Congenital tuberculosis is unlikely to be a problem for the newborn because Ms. N. shows no signs of active disease. Congenital disease is rare unless the mother has untreated, advanced disease.

22. a. High-pitched cry, plethora, tachypnea, and inconsolability

Answer choices b, c, and d list findings that are more typically present in infants of diabetic mothers.

23. d. Meningocele

A meningocele is the extrusion of meninges and CSF through the vertebral column.

24. c. Myelomeningocele

Sensory and motor function loss below the level of the defect is noted with myelomeningocele.

25. a. Tracheoesophageal malformation

Copious drooling, poor feeding with reflux, and acute respiratory distress with feeding is characteristic of esophageal atresia and tracheoesophageal fistula.

26. d. Cold stress in the birthing room

Cold stress can result in all of the consequences listed, thus emphasizing the importance of thermoregulation of the neonate.

27. a. Suckling, swallowing, and gag reflex.

Suckling, swallowing, and gag reflexes are all relatively mature in the term neonate.

28. c. 8.

A perfect score for Apgar is 10. This infant receives only 1 point (out of 2) for color, 1 point (out of 2) for partial flexion of the extremities, 2 points for heart rate (> 100), and 2 points each for respiratory effort and reflex irritability (strong cry).

29. a. 4.

Baby Q receives 0 points for color and only 1 point for each of the other four parameters, for a total of 4.

30. d. The Apgar score is only useful as a systematic way to assess the newborn's immediate adaptation to extrauterine life. The Apgar score is useful as a systematic way to assess the newborn's immediate adaptation to extrauterine life. The other statements are inaccurate.


A patent urachus is the persistence of a fetal opening between the bladder and the umbilical cord.

32. a. The first inhalation requires less ventilatory pressure than later breaths.

The first inhalation requires more ventilatory pressure than later breaths.

33. c. Metabolism of BAT is limited as a means of thermoregulation.

There is a limited supply of brown adipose tissue (BAT), thus limiting its metabolism as a means of thermoregulation.

34. d. Tub baths should be avoided for the first two weeks of life or so until the cord stump has fallen off.

The infant should receive only sponge baths until the cord stump has fallen off because it is important to keep the area dry.

35. b. Congenital hip dislocation is suspected; the baby has an orthopedic appointment in two weeks for evaluation and treatment.

An infant with a suspected congenital hip dislocation would not be a good candidate for early discharge compared with the infants in the other answer choices listed, who can be commonly followed on an outpatient basis.

36. d. Proceed to the next component of the examination without further investigation of these findings.

The head circumference and chest circumference are normal; thus, the midwife should proceed with the next component of the exam.

37. a. Before the infant is born.

The infant's evaluation is begun even before birth via maternal history, risk factors, fetal testing results, and intrapartum factors.

38. c. An infant with head circumference above the 45th percentile and birthweight below the 10th percentile for gestational age would be described as asymmetrically growth restricted. With asymmetric growth restriction, the head circumference is near normal for gestational age.

39. b. 26 to 28 weeks.

Lanugo is sparse to absent in the postmature or very premature infant and is most abundant in midterm infants (28–30 weeks).

40. b. Prenatally acquired hepatitis B.

Hepatitis B often results in prematurity and low birthweight, but not microcephaly.
41. c. the exact cause of SIDS is unknown. There are theories surrounding the cause of SIDS, but the exact cause is unknown. An infant should always be put to sleep on his or her back.

42. a. color perception. The normal newborn’s sensory capacity is most limited in color perception.

43. c. self-console and return to a stable behavioral state. The organized infant is able to integrate physiologic and behavioral systems in response to the environment.

44. c. Most are characterized by enzyme deficiency, resulting in toxic accumulation of metabolites

45. b. Vertex presentation—asymmetry of gluteal folds Asymmetry of gluteal folds is usually indicative of congenital hip dislocation. There is nothing inherent in a vertex presentation that would contribute to a hip dislocation.

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**Bibliography**


Cardiovascular Disorders

Hypertension

- Definition
  1. Hypertension (HTN) constitutes the level of blood pressure that can cause target organ damage (TOD), morbidity, and mortality
  2. Traditional definition—Systolic blood pressure (SBP) of 140 mm Hg or greater, or diastolic blood pressure (DBP) of 90 mm Hg or greater, based on the average of two or more properly measured, seated blood pressure (BP) readings on each of two or more office visits or taking antihypertensive medication

3. Goals for BP per the 8th Joint National Committee (JNC8) (James et al., 2014)
   a. Less than 140/90 for general adult population younger than 60 years of age as well as for adults of any age with diabetes or nondiabetic kidney disease
   b. Less than 150/90 for general adult population 60 years of age or older

4. Evaluation of patients with documented HTN has three objectives
   a. To identify secondary causes
   b. To assess for TOD—eye, brain, blood vessels, heart, and kidney
   c. To identify other cardiovascular risk factors or concomitant disorders that may define prognosis and guide therapy. Major cardiovascular risk factors include:
      (1) Smoking
      (2) Obesity (body mass index [BMI] ≥ 30)
      (3) Physical inactivity
      (4) Dyslipidemia
      (5) Diabetes mellitus
      (6) Microalbuminuria or estimated glomerular filtration rate (GFR) of less than 60 mL/min
      (7) Age older than 55 years in men and older than 65 years in women
      (8) Family history of premature cardiovascular disease (men age < 55 and women age < 65)

- Etiology/incidence
  1. Etiology
     a. Primary or essential
        (1) No discernible cause; a complex polygenic and multifactorial disorder
        (2) Comprises 90–95% of diagnosed cases
     b. Secondary
        (1) Underlying disease or condition identified; requires separate treatment
        (2) Comprises 5–10% of adult cases
  2. Incidence/prevalence (American Heart Association Statistics Committee and Stroke Subcommittee, 2016)
     a. One in three adults has HTN
     b. Approximately 6% of adults have undiagnosed HTN
     c. Men and women have similar percentages of HTN ages 45–64 years
     d. 67.8% of older women (ages 65+ years) have HTN compared with 62% of older men
     e. The prevalence of HTN overall in women is highest in non-Hispanic blacks (42.9%) compared with non-Hispanic whites (27.7%) and Hispanics (27%)

- Symptoms
  1. Symptoms usually not present
  2. In cases of secondary hypertension, may be symptoms associated with secondary condition
     a. Weakness in primary aldosteronism
     b. Truncal obesity and purple striae in Cushing's syndrome
     c. Palpitations, tremor, and sweating in pheochromocytoma
  3. In chronic HTN, may be symptoms associated with TOD
     a. Symptoms associated with peripheral vascular disease, coronary artery disease, and heart failure
     b. Symptoms associated with stroke or transient ischemic attack

- Physical findings
  1. Elevated blood pressure as noted in definition
  2. Findings associated with secondary causes or TOD
     a. Retinopathy
b. S4 gallop, S3 gallop, precordial heave, and displaced point of maximal impulse
c. Renal artery bruit in renal artery stenosis
d. Delayed or absent femoral pulses and decreased blood pressure in lower extremities in coarctation of the aorta
e. Diminished or absent peripheral pulses, edema
f. Neurologic findings

• Differential diagnosis/secondary causes
  1. Sleep apnea
  2. Chronic kidney disease (CKD)
  3. Primary aldosteronism
  4. Renovascular disease
  5. Chronic steroid therapy and Cushing’s syndrome
  6. Pheochromocytoma
  7. Coarctation of the aorta
  8. Thyroid or parathyroid disease
  9. Drug-induced or drug-related
     a. Drug abuse—coca, amphetamines, alcohol
     b. Combination hormonal contraceptives
     c. Sympathomimetics—over-the-counter cold remedies

• Diagnostic tests/findings
  1. Recommended before initiating therapy to rule out secondary causes, determine the presence of risk factors, and assess for TOD
  2. Recommended initial laboratory tests
     a. Urinalysis
     b. Complete blood count (CBC)
     c. Blood glucose, serum potassium, creatinine or estimated GFR, calcium, lipid profile
        (1) Hypokalemia in primary aldosteronism
        (2) Elevated creatinine in renal disease
d. Electrocardiogram (ECG) to assess evidence of ischemic heart disease or left ventricular hypertrophy (LVH)
  3. Optional studies
     a. Measurement of urinary albumin excretion or albumin/creatinine ratio
     b. Thyroid-stimulating hormone (TSH)
     c. Intravenous pyelogram (IVP) to rule out renovascular disease
d. Twenty-four-hour urine for metanephrines and catecholamines to rule out pheochromocytoma
e. Chest radiograph to rule out cardiomegaly and coarctation of the aorta
f. Echocardiogram is more sensitive study to detect LVH

• Goal of therapy—prevent/minimize TOD

2. Nonpharmacologic—lifestyle modifications recommended for all patients with HTN
a. Weight reduction—maintain ideal body weight
b. Adopt Dietary Approaches to Stop Hypertension (DASH) eating plan—diet rich in fruits, vegetables, and low-fat dairy products with a reduced content of saturated and total fat
c. Dietary sodium reduction—less than 2,400 mg NaCl/day
d. Physical activity—engage in aerobic physical activity at least 30 minutes per day most days of the week
e. Moderation of alcohol consumption—no more than one drink/day for women
f. Smoking cessation

3. Pharmacologic
a. General principles of drug therapy for hypertension—JNC 8 (James et al., 2014)
   (1) Set blood pressure (BP) goal and initial BP-lowering medication based on age, diabetes, and CKD
   (2) BP goals
      a. General population (no diabetes or CKD) age 60 years or older—BP goal is SBP less than 150 mm Hg and DBP less than 90 mm Hg
      b. General population (no diabetes or CKD) age younger than 60 years—BP goal is SBP less than 140 mm Hg and DBP less than 90 mm Hg
      c. All ages with diabetes and/or CKD present—BP goal is SBP less than 140 mm Hg and DBP less than 90 mm Hg
   (3) Initial BP-lowering medication
      a. All ages, African American (no diabetes or CKD or diabetes without CKD)—thiazide-type diuretic or calcium channel blocker (CCB), alone or in combination
      b. All ages, Caucasian (no diabetes or CKD or diabetes without CKD)—thiazide-type diuretic or angiotensin-converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB) or CCB, alone or in combination
      c. All ages, all races with CKD present with or without diabetes—ACEI or ARB, alone or in combination with other drug classes
   (4) Select a drug treatment titration strategy
      a. Strategy 1—maximize first medication before adding second medication
         OR
      b. Strategy 2—add second medication before reaching maximum dose of first medication
         OR
      c. Strategy 3—start with two medication classes separately or as a fixed-dose combination
   (5) If BP goal not met with titration strategies
      a. Reinforce medication and lifestyle adherence
      b. Strategy 1 or 2—add and titrate thiazide-type diuretic or ACEI or ARB or CCB (use medication class not previously selected; avoid combining ACEI and ARB)
      c. Strategy 3—titrate dose of initial medications to maximum
      d. If BP goal still not met, add and titrate thiazide type diuretic or ACEI or ARB or CCB (use medication class not previously selected; avoid combining ACEI and ARB)
      e. If BP goal still not met, refer to physician with expertise in hypertension management

b. Classification of drugs for hypertension by drug action (see Table 10-1)
### Table 10-1 Hypertension Pharmacology (Representative List)

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Action</th>
<th>Side Effects</th>
<th>Interactions</th>
<th>Contraindications/Precautions</th>
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</thead>
<tbody>
<tr>
<td><strong>Thiazide diuretics</strong></td>
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<tr>
<td>Hydrochlorothiazide</td>
<td>Inhibits sodium reabsorption from distal renal tubules; reduced sodium results in decreased vascular tone</td>
<td>Hypokalemia and other electrolyte disorders, hyperglycemia, hyperuricemia, orthostatic hypotension, volume depletion, worsening kidney function, transient hyperlipidemia</td>
<td>Enhances other classes of antihypertensives; may decrease oral sulfonylurea and insulin drug efficacy; digitalis and lithium toxicity; NSAIDs may reduce effect of thiazide and increase risk of acute renal failure</td>
<td>Sulfonamide allergy; use caution in patients with impaired renal function, diabetes, history of gout, and elderly who may be at more risk for orthostatic hypotension. Second line as treatment choice during pregnancy, theoretical potential for intravascular volume depletion. Other risks to fetus include a decrease in glucose, platelets, sodium, potassium levels, and possible death resulting from complications with the mother.</td>
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<tr>
<td>Indapamide</td>
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<tr>
<td>Chlorthalidone</td>
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<td><strong>Beta-adrenoreceptor antagonists—beta blockers</strong></td>
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<tr>
<td>Propranolol</td>
<td>Inhibits sympathetic stimulation of the heart; reduces sympathetic outflow to peripheral vasculature; blocks renin release from kidney</td>
<td>Bronchospasm, bradycardia, hypotension, heart failure, may mask insulin-induced hypoglycemia, insomnia, fatigue, decreased exercise tolerance</td>
<td>Additive effect with other antihypertensive agents and alcohol; altered effectiveness of hypoglycemic drugs</td>
<td>Asthma, A-V block, heart failure; use caution with diabetes, older adults. Labetalol may be considered if needed for initial treatment of pregnant women with chronic hypertension; low concentrations of labetalol and propranolol in breastmilk, high concentrations of atenolol.</td>
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<tr>
<td>Atenolol</td>
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<tr>
<td>Labetalol</td>
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<td><strong>Calcium channel antagonists—calcium channel blockers (CCB)</strong></td>
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<tr>
<td>Nifedipine</td>
<td>Blocks influx of calcium through transmembrane calcium channels that trigger smooth muscle contraction; results in prolonged vascular smooth muscle relaxation</td>
<td>Dizziness, hypotension, headache, GI symptoms, peripheral edema, heart failure</td>
<td>Side effects less common with sustained-release forms. Additive effect with other antihypertensive agents and alcohol; risk of digoxin and lithium toxicity. Drugs that inhibit CYP3A4 and grapefruit juice may increase free drug levels</td>
<td>Heart failure, A-V block; significant peripheral edema. Avoid with GERD as may make worse. Nifedipine may be considered if needed for initial treatment of pregnant women with chronic hypertension.</td>
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<tr>
<td>Diltiazem</td>
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<td>Verapamil</td>
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<tr>
<td><strong>Angiotensin-converting enzyme inhibitors—ACE inhibitors</strong></td>
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<tr>
<td>Captopril</td>
<td>Inhibits angiotensin-converting enzyme; prevents conversion of angiotensin I to angiotensin II, thus enhancing vasodilation</td>
<td>Cough, hypotension, rash, angioedema,</td>
<td>Additive effect with other antihypertensive agents and alcohol; increased risk for renal toxicity with NSAIDs; increased risk for hyperkalemia with potassium-sparing diuretics</td>
<td>ACE inhibitor associated or other angioedema bilateral renal artery stenosis, hyperkalaemia. Associated with fetal anomalies, not recommended for pregnant women.</td>
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<tr>
<td>Enalapril</td>
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<td><strong>Angiotensin II receptor blockers—ARB</strong></td>
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<tr>
<td>Losartan, Valsartan</td>
<td>Block binding of angiotensin II to receptor, thus enhancing vasodilation</td>
<td>Similar to ACE inhibitors but not likely to cause cough and less likely to cause angioedema</td>
<td>Same as with ACE inhibitors</td>
<td>Same as with ACE inhibitors, with exception of angioedema. Associated with fetal anomalies, not recommended for pregnant women.</td>
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</table>

Heart Murmurs

- Definition
  1. Prolonged extra heart sounds heard during either systole or diastole; commonly associated with dynamics of regurgitation or stenosis
  2. Classification
     a. Innocent or functional murmurs
        (1) Transient; pose no direct threat to health
        (2) Most frequently heard during systole
        (3) No structural or functional cardiac abnormality
        (4) Often noted in pregnancy because of increased cardiac output
     b. Pathologic murmurs are indicative of heart or valvular disease (e.g., aortic or pulmonary stenosis, atrial septal defect, rheumatic heart disease)
- Etiology/incidence
  1. Etiology
     a. Turbulent blood flow into, through, or out of the heart can result in audible murmur
     b. Characteristics of sound depend on the following factors:
        (1) Size of valve opening
        (2) Integrity of valve
        (3) Vigor of contraction
        (4) Rate of flow
        (5) Thickness of chest wall
  2. Incidence
     a. Innocent systolic murmurs occur in 50–70% of children and up to 50% of adults at some time
     b. Pathologic murmurs are less common, but incidence increases with age
        (1) Congenital—Marfan's syndrome, valve malformation
        (2) Acquired—rheumatic heart disease, mitral valve prolapse (MVP)
- Symptoms
  1. Innocent murmurs—not symptomatic
  2. Pathologic
     a. Possible chest pain
     b. Shortness of breath on exertion
     c. Orthopnea
- Physical findings
  1. Innocent
     a. Usually none except audible murmur
     b. Soft (grade 1 or 2 intensity), medium pitch, systolic murmur
     c. Heard best when patient is supine
     d. Disappears with standing or straining
     e. Increases with increased cardiac output (e.g., fever, exercise)
  2. Pathologic
     a. Diastolic or pansystolic murmur or any murmur above grade 3
     b. Intensifies with exercise or Valsalva maneuver
     c. Mid or late systolic click, associated with MVP
     d. Cyanosis
     e. Jugular vein distension
     f. Hepatomegaly
     g. Pedal edema
     h. Diminished femoral pulses or unequal blood pressure in left and right arms
- Differential diagnosis—focused on differentiating innocent versus pathologic murmur
- Diagnostic tests/findings—indicated only if pathologic murmur suspected
  1. Echocardiography—confirms severity, location of clinically detected lesions
  2. Chest radiograph—suspected cardiac enlargement
  3. CBC—rule out anemia
  4. Thyroid function tests—rule out hyper- or hypothyroidism
- Management/treatment
  1. Low-grade, asymptomatic systolic murmur with low-risk history can be assumed innocent and followed up at next visit
  2. Pharmacologic—bacterial endocarditis prophylaxis for susceptible patients
     a. Patients with valvular heart disease, prosthetic heart valves, or other structural cardiac abnormalities
     b. Indicated with dental, upper respiratory, gastrointestinal, and genitourinary procedures
     c. Give oral amoxicillin 2 g one hour before procedure
  3. Patient education
     a. Self-knowledge and self-disclosure in future encounters
     b. Follow-up schedule if indicated
- Referral
  1. Diastolic murmurs
  2. Suspected pathologic systolic murmurs

Thromboembolic Disease

- Definitions
  1. Thrombosis—blood clot that forms abnormally within blood vessels
  2. Embolus—blood clot that breaks free from its site of formation
  3. Deep vein thrombosis (DVT)—formation of blood clots in deep veins of legs; may break off and lead to pulmonary embolism
4. Thromboembolism—DVT plus systemic embolism
5. Thrombophilia—refers to individuals who have tendency to develop thrombosis from either acquired or inherited causes, or both
6. Superficial phlebitis—inflammation of superficial veins as result of local trauma, venous stasis, or infection

• Etiology/incidence/risk factors
  1. Etiology
     a. Origin of most venous thrombi lie in Virchow's triad—endothelial damage, stasis, hypercoagulability
        (1) Endothelial damage secondary to trauma
        (2) Stasis secondary to immobility
        (3) Hypercoagulability secondary to protein deficiency states such as protein C or S, antithrombin III, nephrotic syndrome, chronic liver disease, and certain malignancies
     b. DVT occurs as blood clots form within the deep venous plexus of the calf or within the popliteal, femoral, and iliac veins
     c. Approximately 40% of DVTs embolize to pulmonary circulation when thigh veins are involved; risk minimal when only calf veins are involved
     d. Prevention of pulmonary embolus (PE) necessitates prompt diagnosis and treatment of DVT
     e. Superficial thromboses usually occur in varicose veins
  2. Incidence of DVT/PE—500,000 cases annually
  3. Risk factors (acquired)
     a. Recent surgery—gynecologic or orthopedic procedures of the hip, knee
     b. Immobilization or venous stasis
     c. Trauma or fractures
     d. Malignancies
     e. Pregnancy and early postpartum
     f. Combination hormonal contraceptives
     g. Congestive heart failure or recent myocardial infarction (MI)
     h. Prior history of thromboembolic disease
     i. Obesity
     j. Inflammatory diseases
     k. Antiphospholipid syndrome
     l. Smoking
  4. Risk factors (inherited)
     a. Factor V Leiden
     b. Homocysteine abnormalities
     c. Prothrombin gene mutation
     d. Protein C or S deficiency

• Symptoms
  1. Superficial phlebitis—localized area of edema, erythema, and tenderness over superficial vein
  2. DVT
     a. Acute onset of unilateral leg pain (calf)
     b. Leg edema
     c. Up to 50% have no symptoms
  3. PE
     a. Unilateral chest pain
     b. Anxiety, restlessness
     c. Dyspnea
  4. Thromboembolism—DVT plus systemic embolism
  5. Thrombophilia—refers to individuals who have tendency to develop thrombosis from either acquired or inherited causes, or both
  6. Superficial phlebitis—inflammation of superficial veins as result of local trauma, venous stasis, or infection

• Physical findings
  1. Superficial phlebitis
     a. Localized area of edema, erythema, and tenderness over a superficial vein
     b. Increased temperature in surrounding skin
  2. DVT—often no findings
     a. Calf tenderness to compression; pain elicited with dorsiflexion of foot (Homan's sign); nonspecific finding
     b. Palpable venous cord
     c. Unilateral leg edema; skin may be warm and erythematous
  3. PE
     a. Cyanosis
     b. Diminished breath sounds over involved area
     c. Tachypnea
     d. Cough with hemoptysis
     e. Tachycardia
     f. Fever

• Differential diagnosis
  1. DVT
     a. Muscle strain or contusion
     b. Cellulitis—more diffuse redness
     c. Popliteal (Baker's) cyst
     d. Superficial phlebitis
  2. PE
     a. Myocardial infarction
     b. Pneumothorax
     c. Pneumonia

• Diagnostic tests/findings
  1. Superficial phlebitis—usually none indicated
  2. DVT
     a. Duplex ultrasound—use as initial test when probability of DVT is intermediate to high; good sensitivity and specificity in symptomatic patients; negative test if intermediate to high probability of DVT requires further testing
     b. Plasma D-dimer enzyme-linked immunosorbant assay (ELISA)
        (1) Measures active breakdown of thrombi
        (2) Elevated in 95–98% of DVT; useful in ruling out DVT if negative
        (3) Positive results are not diagnostic because several other conditions cause positive result (e.g., atrial fibrillation, impaired renal function, pregnancy, ongoing blood loss)
        (4) Best used as initial test if probability of DVT is low
     c. Contrast venography—best used for suspected calf vein thrombus or when clinical findings conflict with ultrasound
     d. Other lab tests for inherited or acquired anticoagulation deficiencies
        (1) Protein C, Protein S
        (2) Antithrombin III
        (3) Antiphospholipid antibodies
        (4) Factor V Leiden
  3. PE
     a. Ventilation-perfusion (V/Q) lung scan
     b. Arterial blood gases
c. ECG and chest radiograph  
de. Plasma D-dimer ELISA  
e. Pulmonary angiogram

- Management/treatment
  1. Refer suspected DVT or PE for immediate medical management
  2. Superficial phlebitis
     a. Nonpharmacologic—elevation of leg and compression with an ace wrap
     b. Pharmacologic—nonsteroidal anti-inflammatory drugs (NSAIDs)
  3. Patient education—for high-risk patients
     a. During prolonged, confined travel—support hose, adequate fluids, passive intermittent contraction of calf muscles, rest breaks to stretch and exercise the legs
     b. May consider low-dose aspirin (81–365 mg) for individuals with risk for DVT who travel long distances
     c. Do not smoke
     d. Do not use estrogen-containing contraceptives

Dyslipidemia

- Definition
  1. Increased levels of total blood cholesterol and low-density lipoproteins (LDLs) or triglycerides (TGs); suppressed high-density lipoproteins (HDLs), or any combination; risk factor for the development of coronary heart disease (CHD) in adults
     a. Elevated LDL-C greater than 130 mg/dL
     b. Hypertriglyceridemia greater than 200 mg/dL
     c. Low HDL-C less than 40 mg/dL
     d. Metabolic syndrome—any three risk factors
        (1) Abdominal obesity/waist circumference
            (a) Men, greater than 40 inches
            (b) Women, greater than 35 inches
        (2) Triglycerides 150 mg/dL or greater
        (3) HDL-C
            (a) Men, less than 40 mg/dL
            (b) Women, less than 50 mg/dL
        (4) Blood pressure 130/85 mm Hg or greater
        (5) Fasting glucose 110 mg/dL or greater

- Etiology/incidence/prevalence
  1. Etiology
     a. Genetic predisposition
     b. Secondary causes
        (1) Obesity
        (2) Disease processes (e.g., endocrine and metabolic disorders, obstructive liver disease, renal disorders)
        (3) Drugs (e.g., corticosteroids, thiazide diuretics, beta blockers)
  2. Incidence/prevalence—dyslipidemia affects more than 50% of all adult women in the United States (Romero, Romero, Shlay, Ogden, & Dabelea, 2012)

- Symptoms—none except those associated with CHD

- Physical findings
  1. Xanthomas—slightly raised, yellowish, well-circumscribed plaques along nasal portion of eyelids
  2. Corneal arcus—thin grayish white arc or circle near edge of cornea
  3. Central obesity

- Differential diagnosis—focused on ruling out secondary causes

- Diagnostic tests/findings
  1. Cholesterol and triglycerides classification—ATP III
     a. Total cholesterol
        (1) Less than 200 mg/dL—desirable
        (2) 200–239 mg/dL—borderline high
        (3) 240 mg/dL or greater—high
     b. LDL cholesterol
        (1) Less than 100 mg/dL—optimal
        (2) 100–129 mg/dL—near or above optimal
        (3) 130–159 mg/dL—borderline high
        (4) 160–189 mg/dL—high
        (5) 190 mg/dL or greater—very high
     c. HDL cholesterol
        (1) Less than 40 mg/dL—low
        (2) 60 or greater mg/dL—high (protective against CHD)
     d. Triglycerides
        (1) Less than 150 mg/dL—normal
        (2) 150–199 mg/dL—borderline high
        (3) 200–499 mg/dL—high
        (4) 500 mg/dL or greater—very high

- Management/treatment
  1. Heart-healthy lifestyle habits are foundation for prevention of CHD
  2. Treatment of dyslipidemia is based on risk of CHD events
     a. Determine if patient has clinically manifested CHD or CHD risk equivalents—peripheral vascular disease, abdominal aortic aneurysm, symptomatic carotid artery disease, diabetes
     b. Determine presence of major risk factors (other than high LDL)
        (1) Cigarette smoking
        (2) Hypertension (BP > 140/90 mm Hg or on antihypertensive medication)
        (3) Low HDL cholesterol (< 40 mg/dL); HDL > 60 counts as negative risk factor—remove one risk factor from the total count
        (4) Family history of premature CHD (CHD in male first-degree relative < 55 years; CHD in female first-degree relative < 65 years)
        (5) Age (men ≥ 45 years; women ≥ 55 years)
     c. If patient has two or more risk factors, without CHD or CHD risk equivalent, determine the 10-year risk of a CHD event with the Framingham risk tool
        (1) Three risk categories
            (a) CHD or CHD risk equivalents = 10-year risk > 20%
            (b) 2+ risk factors without CHD or CHD risk equivalents = 10-year risk ≤ 20%
            (c) 0–1 risk factors = 10-year risk < 10%
     d. Assign a treatment goal for LDL-C based on risk category
        (1) CHD or CHD risk equivalents—LDL-C goal of less than 100 mg/dL
2+ risk factors without CHD or CHD risk equivalents—LDL-C goal of less than 130 mg/dL
3. Contraindications/precautions
   a. Severe liver disease is a contraindication—monitor liver function for elevated liver enzymes
   b. Myopathy is potential side effect, increased risk if combine statin with fibrate or niacin
   c. Use is contraindicated during pregnancy and lactation

Table 10-2—choice of initial statin based on LDL-C level, presence or not of CHD or diabetes, estimated 10-year CHD risk, ability to tolerate statin

<table>
<thead>
<tr>
<th>LDL-C Level</th>
<th>CHD or Diabetes</th>
<th>Estimated 10-Year CHD Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDL-C ≥ 190 mg/dL</td>
<td>no</td>
<td>≥ 7.5%</td>
</tr>
<tr>
<td>LDL-C ≤ 190 mg/dL</td>
<td>yes</td>
<td>&lt; 7.5%</td>
</tr>
</tbody>
</table>

Individuals with diabetes and ≥ 75 years of age: high-intensity statin; < 75 years or if not a candidate for high-intensity statin: moderate-intensity statin

Table 10-3—levels of statin intensity, examples with daily doses

<table>
<thead>
<tr>
<th>Statin</th>
<th>High Intensity</th>
<th>Moderate Intensity</th>
<th>Low Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atorvastatin 40–80 mg</td>
<td>Lower LDL-C on average ≥ 50%</td>
<td>Lower LDL-C on average 30–50%</td>
<td>Lower LDL-C on average &lt; 30%</td>
</tr>
<tr>
<td>Rosuvastatin 20–40 mg</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Patient education
   a. Therapeutic lifestyle changes
   b. Medication regimens, side effects, adverse reactions
   c. Monitoring schedule
   d. Use of highly effective contraception if on statin and could become pregnant

- Referral
  1. Nutritional consultation
  2. Lipid specialist with severe, refractory, or complex disorders

Coronary Heart Disease (CHD)
- Definition—atherosclerotic changes to coronary vasculature; decreased blood flow through coronary arteries due to partial obstruction or vasospasm
- Etiology/incidence/risk factors
  1. Etiology
     a. Atherosclerosis develops with the formation of fatty streaks, fibrous plaques, and complicated lesions that narrow the lumen of the coronary arteries
b. Angina pectoris—myocardial ischemia secondary to inability of the coronary arteries to supply oxygenated blood to meet myocardial oxygen demands

c. Acute coronary syndromes—a plaque may rupture with thrombus formation that impedes or completely occludes the coronary lumen
   (1) Unstable angina
   (2) Acute myocardial infarction

2. Incidence—CHD is the leading killer of women; CHD is the cause of one out of every three deaths in women each year

3. Risk factors include
   a. Cigarette smoking
   b. Hypertension
   c. Dyslipidemia
   d. Diabetes mellitus
   e. Genetic predisposition
   f. Obesity
   g. Sedentary lifestyle
   h. Sleep apnea

• Symptoms
  1. May be asymptomatic
  2. Chronic stable angina pectoris
     a. Clinical syndrome characterized by discomfort in the chest, jaw, shoulder, back, or arm precipitated by exertion and relieved by rest or nitroglycerin
     b. Predictable frequency, severity, duration, and provocation
     c. Pattern remains the same unless there is acceleration of disease process
  3. Acute coronary syndromes—unstable angina and myocardial infarction
     a. May have a constellation of symptoms
     b. Chest pain—pressure, heaviness, squeezing, crushing, aching
     c. Pain generally involves sternum and/or epigastrium
     d. Pain may radiate to shoulder, arm, jaw, neck, back
     e. Associated nausea, vomiting, diaphoresis, dyspnea

• Physical Findings
  1. May be no specific findings
  2. Elevated blood pressure
  3. Dyspnea, tachycardia, pallor, diaphoresis
  4. Heart—changes in point of maximum impulse(s) and heart sounds may occur depending on extent of heart damage or dysfunction

• Differential diagnosis
  1. Chronic stable angina
  2. Unstable angina
  3. Myocardial infarction
  4. Pulmonary disease—pulmonary embolism, pneumothorax, pneumonia
  5. GI disorders—gastroesophageal reflux, cholecystitis, peptic ulcer
  6. Musculoskeletal conditions—costochondritis, muscle strain
  7. Anxiety disorders
  8. Acute aortic dissection
  9. Herpes zoster

• Diagnostic tests/findings
  1. ECG
     a. Acute episode of chronic stable angina—ST-segment depression, symmetric T-wave inversion in affected leads; reverts to normal during pain-free intervals
     b. Unstable angina, myocardial infarction—changes depend on location of involved vessel, amount of myocardium involved, duration of ischemia
  2. Exercise or pharmacologic stress testing—ischemic changes or angina during test is clinically diagnostic
  3. Myocardial perfusion imaging—used to confirm and assess extent and location of coronary artery disease
  4. Coronary angiography—definitive test for coronary artery disease
  5. Laboratory tests—myocardial markers
     a. Troponin I and T—high sensitivity and specificity; become elevated within three to four hours of event and continue to be released for up to seven to 14 days after cardiac event
     b. Myoglobin—released within one to three hours of myocardial cell injury; not as cardiac specific as troponins; normalizes in 24 hours

• Management/treatment
  1. Nonpharmacologic
     a. Primary prevention—smoking cessation; dietary management of hypertension, dyslipidemia, diabetes, obesity; regular aerobic exercise
     b. Secondary prevention—surgical revascularization
        (1) Percutaneous transluminal coronary angioplasty (PTCA)
        (2) Coronary artery bypass graft (CABG)
  2. Pharmacologic—the treatment of chronic stable angina has two major purposes: to prevent myocardial infarction and to reduce the symptoms of angina
     a. Primary prevention
        (1) Medications for treatment of hypertension, diabetes, hyperlipidemia, and smoking cessation
        (2) Aspirin 81–325 mg/day—inhibits platelet aggregation
     b. Secondary management of angina—may use a combination of medications for increased effectiveness, for example, sublingual nitroglycerine, beta-adrenergic blockers, CCB
        (1) Sublingual nitroglycerine 0.4 mg as needed for symptomatic relief of anginal episodes
        (2) Beta-adrenergic blockers—metoprolol, propranolol, atenolol; preferred initial therapy in absence of contraindications; decrease myocardial demand by decreasing heart rate, systolic BP, and contractility
        (3) CCB—verapamil, amiodipine/long-acting formulations only; promote peripheral arterial vasodilatation, thus decreasing oxygen demand by decreasing afterload; also decreases coronary vasospasm
        (4) Long-acting nitrates—nitropaste, nitropatches, isosorbide dinitrate; cause venous dilation, which decreases venous return to heart and modest arterial vasodilation; results in decreased myocardial oxygen demand
  3. Patient education—education and support for lifestyle changes
Eye, Ear, Nose, and Throat Disorders

Allergic Rhinitis

- **Definition**—inflammation of mucous membranes of nose in response to contact with specific allergens, triggering production of IgE antibodies, causing histamine release and subsequent edema, itching, discharge, and sneezing; the eyes, ears, sinuses, and throat can also be involved

- **Etiology/incidence**
  1. **Seasonal**—occurs at specific times of year when pollens/allergens are present (hay fever)
     a. Trees—April to July
     b. Grasses—May to July
     c. Ragweed—August to October
  2. **Perennial**—year-round symptoms usually related to dust mites, mold, cockroaches, and animal dander
  3. Affects approximately 10–20% of adults; onset typically between ages 10–20 years

- **Symptoms**
  1. Nasal congestion, clear rhinorrhea, sneezing
  2. Pruritus of nose, throat, eyes
  3. Sore throat and cough from postnasal drip

- **Physical findings**
  1. Pale, boggy nasal mucosa
  2. Clear, thin rhinorrhea
  3. Nasal crease—horizontal crease across lower bridge of nose caused by repeated upper rubbing of tip of nose with palm of hand
  4. Injected conjunctiva, tearing
  5. “Allergic shiners” or dark discoloration beneath both eyes

- **Differential diagnosis**
  1. Vasomotor rhinitis—triggered by nasal irritants; smoke, perfume, certain medications, alcohol, spicy foods
  2. Rhinitis medicamentosa—excessive topical use of topical vasoconstrictors; cocaine
  3. Septal obstruction—nasal polyps, deviated septum, nasal neoplasms

- **Diagnostic tests/findings**
  1. Usually none indicated for diagnosis
  2. Skin tests to determine specific allergens; gold standard test
  3. Serum allergy tests—radioallergosorbent test (RAST); measures amount of specific IgE to individual allergens, which correlates with the allergic sensitivity to that substance; can determine specific IgE to a number of different allergens at one time; expensive and not as sensitive as specific skin testing

- **Management/treatment**
  1. Nonpharmacologic—allergen avoidance

2. Pharmacologic (see Table 10-4)

a. **Antihistamines**
   1. Generally considered first-line therapy
   2. Highly effective in reducing itching, sneezing, rhinorrhea; minimal effect on nasal congestion
   3. More effective if given before onset of symptoms

b. **Decongestants**—use alone or in combination with antihistamines to treat nasal congestion

c. **Topical (nasal) corticosteroids**
   1. Given their effectiveness, increased use as first-line treatment
   2. Not helpful with ocular symptoms
   3. Slow onset of effect; may use as needed; maximal effectiveness with daily use as maintenance therapy

d. **Mast cell stabilizers/intranasal cromolyns**—no direct anti-inflammatory or antihistamine effects; effective for prophylaxis

e. Montelukast (see Table 10-5)

3. **Patient education**

a. Identify and eliminate or avoid allergens (e.g., remove carpeting, pets; install air filters)

b. Appropriate use of medications; combinations, side effects, and overuse syndromes

- **Referral**—refer for skin tests to determine specific allergens

Conjunctivitis

- **Definition**—encompasses a broad group of conditions presenting as inflammation of the conjunctiva

- **Etiology/incidence**
  1. **Viral conjunctivitis**—adenovirus most common; herpes simplex and herpes zoster
  2. **Bacterial conjunctivitis**—staphylococci, streptococci, C. trachomatis, Neisseria gonorrhea
  3. **Allergic conjunctivitis**—type I, IgE-mediated hypersensitivity reaction precipitated by small airborne allergens (e.g., pollen, animal dander, dust)

- **Symptoms**
  1. Sensation of grit in eye, “scratchy”; mild discomfort
  2. Pain, photophobia, blurred vision that fails to clear with blink are not typical features of primary conjunctival process—may indicate corneal involvement

- **Viral conjunctivitis**
   a. Acute onset; may be unilateral or bilateral with a watery discharge
   b. Preauricular adenitis
   c. May be associated with upper respiratory infection (URI)
<table>
<thead>
<tr>
<th>Drug</th>
<th>Action</th>
<th>Side-effects</th>
<th>Interactions</th>
<th>Contraindications/Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antihistamines</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First generation</td>
<td></td>
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<tr>
<td>Chlorpheniramine</td>
<td>Block action of histamine; anticholinergic effects</td>
<td>Drowsiness, dry mucous membranes, blurred vision</td>
<td>Additive effects with alcohol, sedatives, anxiolytic agents, monoamine oxidase (MAO) inhibitors, tricyclic antidepressants</td>
<td>No fetal malformations associated with use. Diphenhydramine is the antihistamine drug of choice in pregnancy</td>
</tr>
<tr>
<td>Diphenhydramine</td>
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<tr>
<td>Meclizine</td>
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<tr>
<td>Second generation</td>
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<tr>
<td>Loratidine</td>
<td>Selective peripheral histamine receptor antagonist; no anticholinergic effects</td>
<td>Fewer sedating effects (with exception of cetirizine)</td>
<td>Additive central nervous system (CNS) depressant effects with alcohol, barbiturates, tricyclic antidepressants, and loratidine and cetirizine</td>
<td>Caution in patients with renal or hepatic dysfunction. Limited data, no known teratogenic associations</td>
</tr>
<tr>
<td>Desloratidine</td>
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<tr>
<td>Fexofenadine</td>
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<tr>
<td>Cetirizine</td>
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<tr>
<td>Azelastine HCL</td>
<td>Inhibits histamine release from mast cells</td>
<td>Bitter taste, somnolence, headache</td>
<td>Potentiates other CNS depressants</td>
<td>No controlled human data on use in pregnancy.</td>
</tr>
<tr>
<td>Intranasal</td>
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<tr>
<td><strong>Decongestants</strong></td>
<td></td>
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<tr>
<td>Pseudoephedrine</td>
<td>Alpha-adrenergic agonists; vasoconstriction reduces engorgement of mucosa</td>
<td>Increases heart rate and BP, CNS stimulation</td>
<td>Hypertensive crisis with MAO inhibitors</td>
<td>Contraindicated with severe hypertension, cardiovascular disease, MAO inhibitor use. Some evidence of association between first-trimester use of pseudoephedrine and risk of infrequent specific birth defects. No controlled human data on use of phenylephrine during pregnancy</td>
</tr>
<tr>
<td>Phenylephrine</td>
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<tr>
<td><strong>Nasal corticosteroids</strong></td>
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<tr>
<td>Budesonide</td>
<td>Anti-inflammatory effects; therapeutic benefit not immediate</td>
<td>Local irritation, epistaxis, headache; systemic absorption at recommended doses minimal</td>
<td>Cytochrome P450 effect</td>
<td>Not for relief of acute bronchospasm; avoid with Cushing’s syndrome. Very little of nasal corticosteroid is absorbed systemically</td>
</tr>
<tr>
<td>Fulticasone</td>
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</tr>
<tr>
<td><strong>Mast cell stabilizers</strong></td>
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</tr>
<tr>
<td>Cromolyn</td>
<td>Prevents degranulation of mast cells and release of histamine; prophylactic drug</td>
<td>Local reactions: burning, stinging, sneezing</td>
<td>None known</td>
<td>Available data suggest no association with fetal toxicity or teratogenicity</td>
</tr>
</tbody>
</table>

### Table 10-5  Asthma Quick-Relief and Long-Term Control Medications (Representative List)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Action</th>
<th>Side Effects</th>
<th>Interactions</th>
<th>Contraindications/Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short-acting inhaled B₂ agonists</strong></td>
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<td></td>
</tr>
<tr>
<td>Albuterol—metered dose inhaler (MDI), nebulizer solution</td>
<td>Relaxes bronchial smooth muscle by selective action on B₂ receptors Duration 2–6 hours</td>
<td>Tachycardia, nervousness, skeletal muscle tremor</td>
<td>May have increased cardiovascular effects with MAO inhibitors, tricyclic antidepressants, sympathomimetic agents, antagonized by beta-blockers</td>
<td>Caution with cardiovascular disease, diabetes, hyperthyroidism, seizure disorders. No evidence of fetal harm with use; Albuterol is short-acting beta agonist of choice if needed during pregnancy.</td>
</tr>
<tr>
<td><strong>Inhaled corticosteroids</strong></td>
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</tr>
<tr>
<td>Fluticasone MDI/dry powdered inhaler (DPI)</td>
<td>Inhibits inflammatory response</td>
<td>Minimal systemic effects; oropharyngeal candidiasis, hoarseness</td>
<td>Cytochrome P450 effect; caution with CYP3A4 inhibitors (e.g., ketoconazole)</td>
<td>Not for treatment of acute attack. Very little of nasal corticosteroid is absorbed systemically; budesonide is inhaled corticosteroid of choice if needed during pregnancy.</td>
</tr>
<tr>
<td>Budesonide DPI</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Oral corticosteroids</strong></td>
<td></td>
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</tr>
<tr>
<td>Prednisone</td>
<td>Inhibits inflammatory response</td>
<td>Adrenal suppression; masks infection</td>
<td>Effects may be decreased by barbiturates, rifampin, other hepatic enzyme inducers; may be potentiated by ketoconazole, oral contraceptives, NSAIDs</td>
<td>Contraindicated with systemic mycoses; live vaccination. Several studies show possible association with orofacial clefts to use of prednisolone in the first trimester.</td>
</tr>
<tr>
<td><strong>Long-acting inhaled B₂ agonists</strong></td>
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</tr>
<tr>
<td>Salmeterol DPI</td>
<td>Relaxes bronchial smooth muscle by selective action on B₂ receptors; duration 12 hours</td>
<td>Headache, pharyngitis, URI, tachycardia, tremor</td>
<td>May have increased cardiovascular effects with MAO inhibitors, tricyclic antidepressants, sympathomimetic agents, antagonized by beta-blockers</td>
<td>Allergy to milk proteins; should not be used for symptom relief or acute exacerbation; caution with cardiovascular disease, diabetes, hyperthyroidism, seizure disorder. Preliminary data from human studies do not support an association with fetal harm.</td>
</tr>
<tr>
<td><strong>Leukotriene modifiers</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Montelukast</td>
<td>Suppresses leukotriene Biosynthesis; leukotrienes cause the inflammation component of asthma</td>
<td>Headache, fatigue, fever, GI upset</td>
<td>Effects may be decreased with phenobarbital, erythromycin, theophylline; effects may be increased by aspirin, rifampin</td>
<td>Not for treatment of acute attack. No evidence of teratogenicity in animal studies; no controlled human data in pregnancy.</td>
</tr>
<tr>
<td><strong>Mast cell stabilizers</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Cromolyn</td>
<td>Prevents mast cell release of histamine, leukotrienes; inhibits antigen-induced bronchospasm</td>
<td>Throat irritation, bad taste, cough</td>
<td>None identified</td>
<td>Not for treatment of acute attacks. No evidence of teratogenicity in animal studies; no controlled human data in pregnancy.</td>
</tr>
<tr>
<td>Nedocromil</td>
<td></td>
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<tr>
<td><strong>Methylxanthines</strong></td>
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<td></td>
</tr>
<tr>
<td>Theophylline</td>
<td>Relaxes bronchial smooth muscle</td>
<td>Gl upset, headache, CNS stimulation, diuresis, arrhythmias, seizures</td>
<td>Cytochrome P450 effect; numerous drugs may affect serum concentration via induction or inhibition of P450 enzymes</td>
<td>Peptic ulcer disease, arrhythmias, seizure disorders. Some teratogenicity in animal studies; no controlled human data during pregnancy.</td>
</tr>
</tbody>
</table>

4. Bacterial conjunctivitis
   a. Acute onset; symptoms begin in one eye and spread to other eye
   b. Mucopurulent discharge; patient reports eyelids are matted together on awakening
   c. Marked conjunctival injection of abrupt onset with copious purulent discharge associated with gonococcal infection; sight-threatening ocular infection
5. Allergic conjunctivitis
   a. Major cause of chronic conjunctivitis
   b. Complaints of bilateral itching, tearing, redness, and mild eyelid swelling
   c. Discharge is clear and watery, or stringy and mucoid
   d. Personal or family history of atopic disease

- Physical findings
  1. Dilation of superficial conjunctival blood vessels resulting in hyperemia; hyperemia greatest at the periphery
  2. Discharge (see “Symptoms” earlier in this section)
  3. Cornea clear; pupils equal, round, reactive to light (PERRL)
  4. Visual acuity with no acute change
  5. Preauricular adenopathy—most common with viral etiology

- Differential diagnosis
  1. Foreign body
  2. Subconjunctival hemorrhage
  3. Blepharitis
  4. Episcleritis/scleritis
  5. Keratitis
  6. Uveitis
  7. Acute angle closure glaucoma

- Diagnostic tests/findings
  1. Typically none indicated
  2. Fluorescein stain—stain uptake suggests corneal involvement
  3. Cultures if suspect gonococcal or chlamydial infection; chronic or recurrent infection; failure to respond to treatment

- Management/treatment
  1. Viral
     a. Self-limited
     b. Cold compresses and lubricants (liquid tears) for comfort
  2. Bacterial
     a. Broad-spectrum topical antibiotic—sodium sulfacetamide; polymixin B/trimethoprim; tobramycin
     b. Systemic antibiotics for gonococcal or chlamydial infections—ceftriaxone, doxycycline, erythromycin
  3. Allergic
     a. Removal of offending allergen if possible
     b. Topical antihistamine—levocabastine
     c. Mast cell stabilizer—cromolyn
     d. Mast cell stabilizer/antihistamine—olopatadine HCL
     e. Topical NSAIDs—ketorolac
  4. Prevention of transmission of viral or bacterial conjunctivitis
     a. Frequent, thorough handwashing for patient and close contacts
     b. Avoid close contact and sharing linens during acute phase when drainage occurs
  c. Discard opened eye makeup; replace contact lenses, cases, and opened solutions

- Referral
  1. Patients with pain, photophobia, blurred vision; circumcorneal erythema/ciliary flush
  2. Conjunctivitis caused by herpes simplex or herpes zoster
  3. No improvement after 48 hours of treatment

### Acute Otitis Media

- Definition—infection of the middle ear that is often preceded by upper respiratory infection (URI) or allergies
- Etiology/incidence/risk factors
  1. Etiology
     a. Eustachian tube dysfunction secondary to URI (often viral) or allergies causes edema and congestion that impede flow of middle ear secretions; accumulation of secretions promotes growth of pathogens
     b. Common pathogens—*Streptococcus pneumoniae, Haemophilus influenzae, Moraxella catarrhalis, rhinovirus, respiratory syncytial virus*
  2. Risk factors
     3. Highest incidence in childhood, younger than age 10 years; seen infrequently in adults
     a. Recent/current URI
     b. Exposure to cigarette smoke, active or passive
- Symptoms
  1. Rapid onset, short duration if uncomplicated
  2. Ear pain, decreased hearing, fever (adult less likely to have fever)
  3. Aural pressure
  4. Vertigo, nausea, and vomiting
- Physical findings
  1. Full or bulging tympanic membrane (TM) with absent or obscured landmarks
  2. Distorted light reflex
  3. Decreased/absent mobility of TM on pneumatic otoscopy
  4. Erythema of TM is an inconsistent finding
  5. Bullae on TM; often associated with *Mycoplasma pneumoniae*
  6. Postauricular or cervical lymphadenopathy

- Differential diagnosis
  1. Otitis externa
  2. Otitis media with effusion
  3. Temporomandibular joint (TMJ) syndrome
  4. Dental abscess
  5. Mastoiditis

- Diagnostic tests/findings
  1. Usually none indicated
  2. Tympanometry for recurrent infections; indicator fluid posterior to TM

- Management/treatment
  1. Most uncomplicated cases of acute otitis media resolve spontaneously without antibiotic treatment
2. Requires follow-up with antibiotic treatment if symptoms worsen or do not improve within 48–72 hours of symptom onset

3. Pharmacologic
   a. Antibiotics
      (1) Amoxicillin; for penicillin-allergic patients, trimethoprim/sulfamethoxazole (TMP/SMX) or erythromycin; if inadequate response, change to amoxicillin-clavulanate
      (2) Contraindications/precautions
         (a) TMP/SMX may potentiate anticoagulants and hypoglycemic agents
         (b) Avoid use of TMP/SMX during first and third trimesters of pregnancy
   b. No demonstrated benefit with use of decongestants
   c. Analgesics/antipyretics—acetaminophen, NSAIDs

4. Patient education
   a. Appropriate ear canal hygiene
   b. Antibiotic use and side effects
   c. Need for additional care if no improvement in two to three days
   d. Cessation of smoking and avoidance of secondhand smoke exposure

• Referral
  1. For suspected extension of infection, mastoiditis, or perforation of TM
  2. Persistent hearing loss after adequate treatment
  3. Adults with recurrent otitis media need ears, nose, and throat (ENT) referral to rule out underlying process (e.g., malignancy)

Sinusitis

• Definition—inflammation of the mucosal surface of the paranasal sinuses

• Etiology/incidence
  1. Etiology
     a. Acute sinusitis—caused by viral or bacterial infections and allergies; bacterial causes include Streptococcus pneumoniae, Haemophilus influenzae, Moraxella catarrhalis
     b. Infection usually involves maxillary and ethmoid sinuses
     c. Chronic sinusitis occurs with episodes of prolonged infection that resist treatment and/or repeated or inadequately treated acute infection; treatment failure secondary to failure of sinuses to drain, which may be associated with anatomic defect
  2. Incidence—accounts for 6% of primary care office visits

• Symptoms
  1. Acute sinusitis
     a. Nasal congestion, facial pain, toothache, headache, fever, yellow/green nasal drainage
     b. Increased pain with bending over or sudden head movement
     c. Common cold and allergic/vasomotor rhinitis may precede infection
     d. “Double sickening”—URI symptoms with initial improvement followed by increasing nasal symptoms
  2. Chronic sinusitis
     a. Nasal congestion, discharge, and cough that last longer than 30 days
     b. Dull ache or pressure across forehead and/or midface
     c. Constant postnasal drip and chronic cough

• Physical findings
  1. Afebrile or low-grade fever
  2. Mucopurulent nasal discharge; postnasal discharge
  3. Nasal mucosa swollen, pale, dull red to gray
  4. Pain on firm palpation over sinus areas

• Differential diagnosis
  1. Uncomplicated URI
  2. Migraine headaches
  3. Allergic/vasomotor rhinitis
  4. Nasal polyps
  5. Dental abscess
  6. Trigeminal neuralgia

• Diagnostic tests/findings
  1. None for typical presentation
  2. Maxillofacial CT scan—reserved for complicated disease and search for ethmoidal disease in patients with refractory symptoms

• Management/treatment
  1. Nonpharmacologic
     a. Saline nasal spray
     b. Steam inhalation
     c. Warm compresses
     d. Hydration
  2. Pharmacologic
     a. Antibiotics (see “Acute Otitis Media” section in this chapter)
        (1) If symptoms are present 10 or more days without any clinical improvement
        (2) If symptoms worsen after five to six days when was initially improving
        (3) If high fever (≥102°F) and facial pain or purulent nasal discharge for three or more days
     b. Oral/topical decongestants
        (1) Oral decongestants (see Table 10-2)
        (2) Topical decongestant/oxymetazoline spray 0.05%
           (a) Provides rapid relief
           (b) Should not be used for longer than three to five days to prevent rebound congestion
     c. Nasal steroids—to reduce mucosal inflammation (see Table 10-2)
     d. Antihistamines not recommended unless patient has allergies
     e. Pain management as needed with acetaminophen, NSAIDs

3. Patient education
   a. Avoidance of allergens, environmental irritants (e.g., cigarette smoke)
   b. Importance of maintaining adequate hydration

• Referral
  1. Severe facial pain, periorbital swelling
  2. Failure to respond to two courses of antibiotic
  3. Suspected anatomic abnormality
  4. Chronic sinusitis or more than three episodes of acute sinusitis per year
Common Cold

- Definition—an acute, mild, self-limited viral infection of the upper respiratory tract mucosa
- Etiology/incidence/risk factors
  1. Etiology
     a. Inflammation of the mucosal membranes from the nasal mucosa to the bronchi
     b. Rhinovirus, coronavirus, adenovirus
     c. Spread by airborne droplets and contact with infectious secretions on hands and environmental surfaces
     d. Incubation period 48–72 hours
  2. Incidence
     a. Peaks in winter months
     b. Children—six to eight infections per season
     c. Adults—two to four per season
  3. Risks
     a. Repeated exposure to groups of children
     b. Close quarters, contact
- Symptoms
  1. General malaise
  2. Nasal congestion and clear rhinorrhea
  3. Sneezing, coughing, sore throat, hoarseness
  4. Tearing, burning sensation of eyes
- Physical findings
  1. Low-grade fever
  2. Nasal mucosa swollen and erythematous
  3. Conjunctiva slightly red
  4. Throat erythematous with cervical lymphadenopathy
- Differential diagnosis
  1. Allergic rhinitis
  2. Streptococcal pharyngitis
  3. Influenza
  4. Otitis media
- Diagnostic tests/findings
  1. Generally none recommended
  2. Rapid strep screen/throat culture if streptococcal pharyngitis suspected
- Management/treatment
  1. Nonpharmacologic
     a. Inhalation of warm vapors
     b. Saline nasal drops or sprays
     c. Saline gargles/throat lozenges
     d. Increase fluids
  2. Pharmacologic
     a. Acetaminophen or NSAIDs
     b. Topical/oral decongestants (see Table 10-2)
     c. Cough suppressants—e.g., dextromethorphan
        (1) Drug action—depresses cough reflex by direct inhibition of cough center in the medulla
        (2) Contraindications/precautions

Pharyngitis

- Definition—inflammation of the pharynx and tonsils
- Etiology/incidence
  1. Etiology
     a. Viral—most common cause is rhinovirus and adenovirus
     b. Bacterial
        (1) Group A beta-hemolytic streptococci (GABHS)
        (2) Neisseria gonorrhoeae
     c. Noninfectious causes—allergic rhinitis or postnasal drip
  2. Incidence
     a. One of the most frequent reasons for outpatient care in the United States
     b. Accounts for 16 million office visits per year; 2.5% of visits to primary care providers
- Risks—crowded work or living conditions
- Symptoms
  1. Viral pharyngitis
     a. Sore throat, fever, malaise, cough, headache, myalgia, and fatigue
     b. May also complain of rhinitis, congestion, conjunctivitis
  2. GABHS
     a. Sudden onset of sore throat, fever, chills, headache, nausea/vomiting
     b. Rhinitis, cough, conjunctivitis not typically present
- Physical findings
  1. Viral pharyngitis—mild erythema of the pharynx with little or no exudates
  2. Bacterial pharyngitis
     a. Marked erythema of the throat, exudates, tender anterior cervical lymphadenopathy
     b. Erythematous “sandpaper” rash/accenuation in groin and axillae with scarlet fever
Symptoms
1. Prodrome of headache, malaise, fatigue, anorexia
2. Fever, sore throat, swollen lymph nodes (classic triad)

Physical findings
1. Tonsillar enlargement with exudate
2. Palatal petechiae at junction of hard and soft palates (25% of cases)
3. Lymphadenopathy; particularly posterior cervical chain
4. Fever compatible with severity of infection
5. Hepatomegaly (25% cases)

Differential diagnosis
1. Streptococcal pharyngitis
2. Other viral causes of pharyngitis
3. Acute cytomegalovirus (CMV) infection
4. Acute human immunodeficiency virus (HIV) infection

Diagnostic tests/findings
1. Monospot/heterophile antibody test
   a. Sensitivity 63–84%; specificity 84–100%
   b. Initially negative, usually positive by one to two weeks after onset of symptoms
2. CBC—lymphocytic leukocytosis; atypical lymphocytes common
3. Liver function tests (LFTs)—may have elevated aminotransferases (AST, ALT), bilirubin
4. Throat culture—secondary infection with GABHS in about 30%
5. CT scan—may reveal splenomegaly and/or hepatomegaly

Management/treatment
1. Nonpharmacologic—lozenges, gargles for relief of pharyngitis; treatment largely supportive
2. Pharmacologic
   a. GABHS
      (1) Penicillin V PO/benzathine penicillin IM
         (a) Drug action—bactericidal
         (b) Side effects—hypersensitivity reactions
         (c) Contraindications/precautions—penicillin allergy
      (2) Erythromycin if penicillin allergy
   b. Gonococcal pharyngitis—ceftriaxone IM
      (1) Drug action—bactericidal
      (2) Contraindications/precautions
         (a) Penicillin allergy is generally a contraindication; alternative agents are azithromycin, spectinomycin; obtain pharyngeal culture three to five days after treatment if use alternative regimen

Referral
1. Suspected peritonsillar abscess
2. Epiglottitis

Infectious Mononucleosis (IM)

Definition—an acute, self-limiting viral syndrome characterized by fever, malaise, pharyngitis, and lymphadenopathy

Etiology/incidence
1. Etiology
   a. Causal agent is most often Epstein-Barr virus (EBV)
   b. Mode of transmission is oropharyngeal route via saliva
2. Incidence—rarely symptomatic in children younger than five years; most clinically apparent infections occur in individuals 10–30 years old; peak rate ages of 15–19 years

Lower Respiratory Disorders

Community-Acquired Pneumonia

Definition—acute infection of the lower respiratory tract that is associated with at least two symptoms of active pneumonia infection in an individual who has not been hospitalized or resided in a long-term care facility for 14 days before the onset of symptoms
2. Value of sputum collection for Gram's stain and culture is controversial—not recommended as routine for outpatients diagnosed with community-acquired pneumonia
3. CBC with differential—white blood cell (WBC) elevation (10,000/mm³ to 25,000/mm³) with a shift to left (e.g., bandemia, neutrophilia, especially if bacterial etiology)
4. TB test

• Management/treatment
1. Nonpharmacologic
   a. Oral hydration and humidification
   b. Improve oxygenation (e.g., smoking cessation)
2. Pharmacologic
   a. Empiric antimicrobial therapy—American Thoracic Society (Mandell et al., 2007)
      (1) Patients who are otherwise healthy with no risk factors for drug-resistant streptococcus pneumonia (DRSP)—advanced generation macrolide (azithromycin or clarithromycin)
         a. Drug action—inhibits bacterial protein synthesis
         b. Contraindications/precautions—contraindicated if allergy to macrolide antibiotics; alternative antibiotic is doxycycline, which is contraindicated during pregnancy
      (2) Patients with comorbidity, risk factors for DRSP including age older than 65 years or nursing home residence, or use of antimicrobials within previous three months (use alternative from different class)—fluoroquinilone (levofloxacin, moxifloxacin, gemifloxacin)
   b. Antipyretics—acetaminophen, NSAIDs
3. Patient education
   a. Infection containment principles
   b. Need for hydration
   c. Rest
   d. Avoid cough medicines if have a productive cough so can clear thick secretions
   e. Medication schedules and side effects
   f. Prevention—annual influenza vaccination; pneumonia vaccination for individuals age 65 years or older or at high risk for pneumonia; smoking cessation

• Referral/physician consult
1. Fever over 102°F, pallor or cyanosis, nasal flaring
2. No improvement in 24 to 36 hours
3. CURB-65 criteria—hospitalize for treatment if patient has two or more of the following five criteria
   a. Confusion
   b. Uremia (BUN > 19 mg/dL)
   c. Respiratory rate > 30 bpm
   d. Blood pressure < 90 mm Hg systolic or 60 mm Hg diastolic
   e. 65 years old

Asthma

• Definition
1. A chronic inflammatory disorder of the Airways in which many cells and cellular elements play a role—characterized by recurring symptoms, airflow obstruction, bronchial hyperresponsiveness;
Airflow obstruction is widespread, variable and usually reversible with an improvement of Forced expiratory volume in 1 second (FEV₁) > 12% with short-acting bronchodilator

2. Classifications—intermittent (stage 1), mild persistent (stage 2), moderate persistent (stage 3), severe persistent (stage 4) used as basis for treatment decisions based on
   a. Frequency and timing of symptoms
   b. Degree of variation in pulmonary function throughout the day
   c. Degree of impairment that patient experiences from having asthma
   d. Intermittent—stage 1
      (1) Daytime symptoms two times/week or less; nocturnal symptoms two times/month or less
      (2) Use of short-acting beta-agonist inhaler two days/week or less
      (3) No to one exacerbation requiring oral corticosteroids over the last year
      (4) No interference with normal activity
      (5) Forced expiratory volume in 1 second—FEV₁ greater than 80% predicted; normal FEV₁/FVC ratio for age between exacerbations
   e. Mild persistent—stage 2
      (1) Daytime symptoms greater than two times/week but not daily; nocturnal symptoms three to four times/month
      (2) Use of short-acting beta-agonist inhaler to manage symptoms greater two days/week, no more than one time a day and not daily
      (3) Two or more exacerbations requiring oral corticosteroids over last year
      (4) Mild interference with normal activity
      (5) FEV₁ greater than 80% predicted; normal FEV₁/FVC ratio for age between exacerbations
   f. Moderate persistent—stage 3
      (1) Daily symptoms; nocturnal symptoms more than once per week but not nightly
      (2) Daily use of short-acting beta-agonist inhaler to manage symptoms
      (3) Two or more exacerbations requiring oral corticosteroids over last year
      (4) Some limitation in performing normal activities
      (5) FEV₁, 60% to 80% predicted; normal FEV₁/FVC ratio for age reduced by 5%
   g. Severe persistent—stage 4
      (1) Continual daily symptoms; frequent nocturnal symptoms
      (2) Use of short-acting beta-agonist throughout day for symptom control
      (3) Two or more exacerbations requiring oral corticosteroids over previous year
      (4) Major limitation in performing normal activities
      (5) FEV₁, less than 60% predicted; normal FEV₁/FVC ratio for age reduced by > 5%

- **Etiology/incidence**
  1. **Etiology**
     a. Caused by single or multiple triggers
        (1) Allergic triggers
           (a) Airborne pollens, molds, dust mites, cockroaches, animal dander
           (b) Food additives or preservatives
           (c) Feather pillows
        (2) Nonallergic triggers
           (a) Smoke and other pollutants
           (b) Viral respiratory infections
           (c) Medications—ASA, NSAIDs, beta blockers
           (d) Exercise
           (e) Gastroesophageal reflux
           (f) Emotional factors
           (g) Menses, pregnancy
     b. In children, there is generally a strong history of atopy; adult-onset asthma may be related to allergens, but nonallergic triggers likely to be a factor
  2. **Incidence**
     a. Affects approximately 10% of children and 5% of adults
     b. Can occur at any age; increasing in prevalence in the United States

- **Symptoms**
  1. Episodic wheeze, chest tightness, shortness of breath or cough; cough may be sole symptom
  2. Symptoms worsen in presence of allergens, irritants, and exercise
  3. Symptoms occur or worsen at night; cause nighttime awakening

- **Physical findings**
  1. Hyperexpansion of thorax; hyperresonance with percussion
  2. Wheezing; prolonged expiratory phase
  3. Diminished breath sounds
  4. Tachypnea, dyspnea
  5. Atopic dermatitis/eczema or other skin manifestations of allergic skin disorders
  6. Increased nasal secretions, mucosal swelling, nasal polyps

- **Differential diagnosis**
  1. Acute infection—bronchitis, pneumonia
  2. COPD; may overlap with asthma
  3. Heart disease—heart failure
  4. Foreign body aspiration
  5. Pulmonary emboli
  6. Cough secondary to drugs such as ACE inhibitors

- **Diagnostic tests/findings**
  1. Pulmonary function tests/spirometry—useful to differentiate between restrictive lung disease and obstructive lung disease and to determine severity of airway obstruction
     a. FVC—normal is > 80% of predicted value; useful for diagnosing restrictive lung disease
     b. FEV₁ used to determine severity of airway obstruction—normal is > 80% of predicted norm for age, gender, height; measured with spirometry
     c. FEV₁/FVC ratio used to detect airway obstruction—normal is > 70% for middle-aged adult; measured with spirometry
  2. Peak expiratory flow (PEF) with peak flow meter—< 80% of personal best suggests obstruction; measured at home or office
  3. Chest radiograph if infection, large airway lesions, heart disease, or foreign body obstruction suspected
Management/treatment

1. Goals
   a. Minimize symptoms, normalize daily activity
   b. Maintain near-normal pulmonary function
   c. Minimal use of short-acting $\beta_2$-agonist

2. Nonpharmacologic
   a. Peak flow monitoring
      (1) Establish patient's personal best and develop Asthma Action Plan
      (2) A drop in peak flow below 80% indicates an acute exacerbation and need to contact clinician for medication adjustment
      (3) A drop in peak flow below 50% indicates need for emergency treatment
   b. Avoidance of known allergens, triggers
   c. Adequate hydration and humidity
   d. Annual influenza vaccine; pneumococcal vaccine

3. Pharmacologic—see Table 10-5
   a. Staged approach for treatment (see Box 10-1)

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**Box 10-1  Staged Approach for Treatment**

### Intermittent—stage 1
- No daily medications
- Short-acting inhaled $\beta_2$-agonist as needed for symptoms
- Course of systemic corticosteroids recommended for severe exacerbations

### Mild persistent—stage 2
- Low-dose inhaled corticosteroids
- Alternative treatments—mast-cell stabilizer, leukotriene modifier, theophylline
- Short-acting inhaled $\beta_2$-agonist as needed for symptoms

### Moderate persistent—stage 3
- Low- to medium-dose inhaled corticosteroids and long-acting inhaled $\beta_2$-agonist
- Alternative treatments: add leukotriene or theophylline; increase inhaled corticosteroid within medium dose range
- Short-acting inhaled $\beta_2$-agonist as needed for symptoms

### Severe persistent—stage 4
- High-dose inhaled corticosteroids and long-acting inhaled $\beta_2$-agonist; oral corticosteroid if needed
- Short-acting inhaled $\beta_2$-agonist as needed for symptoms

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b. Severe exacerbation (peak flow < 60%) can occur with any category of asthma; consider short course of oral corticosteroids 40–60 mg/day for five to 10 days

c. Treatment of asthma in pregnancy (American College of Obstetricians and Gynecologists, 2008; National Heart, Lung, and Blood Institute, 2007)
   (1) Uncontrolled asthma increases the risk of perinatal mortality, preeclampsia, preterm birth, and low-birthweight infants

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(2) It is safer for pregnant women to be treated for asthma than to have asthma symptoms and exacerbations
(3) Albuterol is the preferred short-acting inhaled $\beta_2$-agonist; inhaled corticosteroids may be used; use lowest dose needed to maintain normal respiratory function and have good control of symptoms

4. Patient education
   d. How to recognize signs of worsening asthma
   e. Use of peak flow meter
   f. Clear instructions on use of written Asthma Action Plan
   g. Proper use of inhaler for effective dosing
   h. Prophylactic medication (e.g., preexercise dosing)
   i. Control of environmental factors (e.g., allergens and irritants)

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**Tuberculosis (TB)**

1. Active TB disease (ATBD)—signs, symptoms, and radiographic findings secondary to *M. tuberculosis*; disease may be pulmonary or extrapulmonary
2. TB infection/latent TB infection (LTBI)
   a. Positive tuberculin skin or blood test with no signs or symptoms of disease
   b. Chest radiograph negative or only granulomas/calcifications in lungs and/or regional lymph nodes
   c. Not infectious to others

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**Etiology/incidence/risk factors**

1. Etiology—*Mycobacterium tuberculosis*; spread by small airborne particles
2. Incidence
   a. Ten to 15 million infected in United States
   b. Ninety to ninety-five percent of primary TB infections remain in a latent or dormant stage
3. Risk factors
   a. Individuals with weakened immune systems—HIV-infected, severe kidney disease, organ transplant, long-term corticosteroid therapy
   b. Individuals who are incarcerated, in long-term institutional living, or in crowded conditions
   c. Individuals who abuse drugs or alcohol
   d. Individuals who have emigrated from countries with high TB rates
   e. Individuals who work in institutions or facilities that serve high-risk individuals—hospitals, long-term care, correctional facilities, homeless shelters
   f. Household contacts of diagnosed cases

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**Symptoms**

1. TB infection/LTBI
   a. Asymptomatic state may last months to years
   b. Ten percent go on to develop active TB
2. Active TB/ATBD
   a. Generalized symptoms
      (1) Night sweats, fever
      (2) Malaise, weakness
      (3) Anorexia
      (4) Weight loss
   b. Pulmonary symptoms
      (1) Productive cough, possible hemoptysis
      (2) Chest pain
      (3) Dyspnea
   c. Systemic symptoms (extrapulmonary sites)
      (1) Pelvic pain
      (2) Flank pain

• Physical findings
  1. Generally normal appearance in early disease, progressing to cachectic
  2. Unexplained fever
  3. Lung findings—increased tactile fremitus and dullness to percussion over consolidated areas; apical rales
  4. Advanced disease—purulent green or yellow sputum
  5. Hemoptysis

• Differential diagnosis
  1. Pneumonia
  2. Malignancy
  3. COPD
  4. Silicosis
  5. Sarcoïdosis

• Diagnostic tests/findings
  1. Purified protein derivative (PPD) skin test (antigen response)
     a. Positive test indicates exposure, not active disease
     b. Individual must return to office in 48-72 hours to interpret test results
     c. PPD interpretation—measure area of induration, not erythema
        (1) A reaction of 5-mm induration or greater is considered positive in patients with
            (a) HIV infection or in immunocompromised/immuno-suppressed individuals
            (b) Those with abnormal chest radiographs consistent with healed TB lesions
            (c) Recent close contact with infected person
        (2) A reaction of 10-mm induration or greater is considered positive among
            (a) Recent arrivals (< 5 years) from high-prevalence areas
            (b) Low socioeconomic status, homeless
            (c) Aged, nursing home residents, incarcerated individuals
            (d) Individuals with chronic disease or predisposing conditions (e.g., gastrectomy, diabetes mellitus, or corticosteroid therapy)
        (3) A reaction of 15-mm induration or greater is considered positive among individuals without risk factors
     d. False negative
        (1) PPD administered after recent live virus vaccination
        (2) Immunosuppressed
        (3) Elderly
        (4) Incorrect administration—needs to be intradermal
     e. False positive
        (1) Previous Bacillus Calmette–Guérin (BCG) vaccination
        (2) Nontuberculosis mycobacterium
        f. Positive converter—previous negative PPD

2. Interferon-gamma release assay (IRGA) blood test—measures immune reaction to bacteria causing TB
   a. Requires only one visit; test results within 24 hours
   b. Not affected by prior BCG vaccination
   c. Reported as positive or negative
   d. More expensive

3. Chest radiography, both anteroposterior and lateral views; indicated with positive skin or blood TB test result
   a. Identifies active pulmonary disease; negative chest radiograph rules out active TB
   b. Radiologic findings include apical scarring, hilar adenopathy with peripheral infiltrate and upper lobe cavitation

4. Three sputum samples required for both smear and culture in patients suspected of pulmonary TB
   a. A presumptive diagnosis of TB can be made with detection of acid-fast bacilli in sputum smear
   b. A positive culture for M. tuberculosis is essential to confirm diagnosis

• Management/treatment
  1. LTBI
     a. Nonpharmacologic—not applicable
     b. Pharmacologic
        (1) Treatment goal—stop progression to active disease state
        (2) Recommended for individuals at high risk of exposure and those at high risk of progression from LTBI to active disease—same as risk factors for acquiring infection
        (3) Treatment with isoniazid for nine months
           (a) Drug action—inhibition of mycolic acid synthesis resulting in disruption of bacterial cell wall
           (b) Contraindications/precautions
              i. Contraindicated with severe hepatic disease; monitor transaminase levels at baseline and at three, six, and nine months
              ii. Risk for peripheral neuropathy; supplement with vitamin B6 (pyridoxine) 50 mg each day
              iii. Considered safe during pregnancy; may consider delaying treatment of LTBI in low-risk pregnant women until postpartum
  2. Active disease treatment—consult/referral to specialist
     a. Nonpharmacologic
        (1) Well-balanced diet; additional caloric intake may be needed to maintain or gain weight
        (2) Outdoor exercise
     b. Pharmacologic
        (1) Typical regimen includes isoniazid, rifampin, pyrazinamide for two months; isoniazid and rifampin for four months; given resistance concerns include ethambutol in initial regimen until drug susceptibility tests are known
        (2) Directly observed therapy (DOT) is one method to ensure compliance; healthcare provider/designee observes patient ingest medications
3. Patient education
   a. Importance of continuous treatment
      (1) Possibility of microbial resistance
      (2) Signs of developing side effects, drug interactions
   b. Infection control principles
      (1) Reducing respiratory droplet broadcast
      (2) Care with disposal of infected wastes, tissues
      (3) Avoiding crowded conditions, contact with susceptible individuals while infectious
   c. Follow-up requirements, liver function monitoring
   d. Necessity for contact evaluation and treatment
   e. Importance of general health maintenance

- Referral
  1. Patients with ATBD
  2. Report all cases to state and local health departments

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**Gastrointestinal Disorders**

**Constipation**

- Definition—infrequent or difficult evacuation of stool
  1. Constipation is a symptom rather than a disease
  2. May include incomplete evacuation of stool, straining during bowel movement, hard stools, less than three bowel movements in a week

- Etiology/incidence
  1. Etiology
     a. Functional causes—low-fiber diet, motility disorders (irritable bowel syndrome), sedentary lifestyle, dehydration
     b. Structural abnormalities—anal disorders (anal fissure), colon polyps or tumors, diverticulosis
     c. Hypothyroidism
     d. Neurologic, neuromuscular disorder—multiple sclerosis, spinal cord disorders
     e. Celiac disease
     f. Medications—laxative overuse, anticholinergics, opioids, CCB, iron supplements
     g. Pregnancy
  2. Prevalence—unknown because of frequent self-treatment; commonly reported by patients, especially elderly adults
  3. Risks—see “Etiology/incidence”; more common in elderly

- Symptoms
  1. Typically fewer than three bowel movements per week
  2. Hard feces, difficult to pass
  3. Abdominal bloating or pain
  4. Hemorrhoids
  5. Sense of incomplete evacuation
  6. Having to use fingers to help stool passage

- Physical findings
  1. Firm-to-hard stool in rectum
  2. Fecal impaction

- Abdomen
  a. Normal bowel sounds
  b. Nontender with simple constipation

- Differential diagnosis—see “Etiology/incidence”; constipation is a symptom, not a disease

- Diagnostic tests/findings—indicated when “red flags” identified, constipation is persistent or fails to respond to treatment, or particular disorder suspected
  1. Red flags
     a. Abdominal pain, nausea/vomiting
     b. Weight loss
     c. Melena, rectal bleeding
     d. Rectal pain
     e. Fever
     f. New onset older than age 50 years
  2. Diagnostic tests
     a. Typically none needed
     b. CBC, TSH
     c. Stools for occult blood test
     d. Flexible sigmoidoscopy/colonoscopy

- Management/treatment
  1. Nonpharmacologic
     a. Increased fluid intake
     b. Increased physical activity
     c. High-fiber diet—bran, fruits, vegetables, whole grain cereals and bread
     d. Plan time for elimination, consistent time each day
  2. Pharmacologic
     a. Bulk-forming agents—psyllium husk, methylcellulose, calcium polycarbophil
        (1) Drug action
           a. Increased stool bulk, retention of stool water, reduces transit time
           b. Used to prevent constipation, not useful treatment of acute constipation
        (2) Contraindications/precautions
           a. May result in decreased absorption of some medications
           b. Do not use if patient has signs of fecal impaction or GI obstruction
           c. May use during pregnancy
     b. Stool softeners—docusate sodium
        (1) Drug action
           a. Act as surfactants; lower surface tension, which facilitates penetration of water into stool
           b. Useful for patients complaining of hard stools and those for whom straining at stool should be avoided
        (2) Contraindications/precautions
           a. Do not use if patient has acute abdominal pain, signs of GI obstruction
           b. May use during pregnancy
     c. Osmotic laxatives—sorbitol, lactulose, polyethylene glycol
        (1) Drug action
           a. Nonabsorbable disaccharide that acts as osmotic diuretic
           b. Drug of choice after bulk-forming laxatives for chronic constipation
Diarrhea

Definition—defecation of loose, watery stools three or more times a day
1. Diarrhea is a symptom rather than a disease
2. Acute—less than one to two weeks' duration
3. Chronic—more than three weeks' duration, continuous or intermittent

Etiology/incidence/risk factors
1. Etiology
   a. Acute
      (1) Viral—Norwalk
      (2) Bacterial—Salmonella, Shigella, E. coli (traveler's diarrhea)
      (3) Protozoa—Giardia lamblia, E. histolytica
      (4) Bacterial toxins—Staphylococcus, Clostridium
      (5) Medications—antibiotics, laxatives, antacids
   b. Chronic or recurrent
      (1) Protozoa—Giardia lamblia, E. histolytica
      (2) Inflammatory—ulcerative colitis, Crohn's disease, ischemic colitis
      (3) Medications—antibiotics, laxatives, antacids
      (4) Functional—irritable bowel syndrome
      (5) Malabsorption—sprue, pancreatic insufficiency, lactase deficiency
      (6) Postsurgical—gastric bypass, dumping syndrome
      (7) Hyperthyroidism
2. Incidence—estimated that the average adult in the United States experiences one to two acute diarrheal episodes per year
3. Risk factors
   a. Travel to some countries in Africa, Asia, Latin America, Caribbean
   b. Close contact with infected persons (e.g., day care, institutionalization)
   c. Decreased immunity—more susceptible to organisms that generally do not cause symptoms in immunocompetent hosts

- Symptoms
  1. Increased frequency and volume of stools
  2. Crampy abdominal pain
  3. May be associated with nausea and vomiting
  4. Dehydration if severe
- Physical findings
  1. Acute
     a. Occasionally—low-grade fever; postural changes in pulse, blood pressure
     b. Abdominal examination—hyperactive bowel sounds; diffuse tenderness to palpation
  2. Chronic—signs associated with specific causes (e.g., thyromegaly, lymphadenopathy, rectal mass, impaction)
- Differential diagnosis—see "Etiology"; diarrhea is a symptom, not a disease
- Diagnostic tests/findings
  1. Usually none indicated for symptoms lasting less than 72 hours unless associated with bloody diarrhea or patient appears ill
  2. If persistent or chronic
     a. Stool evaluation
        (1) For fecal leukocytes
        (2) For occult blood
        (3) For culture for bacterial pathogens
        (4) For ova and parasites
        (5) Giardia antigen assay
        (6) Clostridium difficile toxin assay
        (7) Qualitative fat (sudan stain)—fat content increased in presence of small bowel disease or pancreatic insufficiency
     b. HIV testing
     c. CBC, electrolytes, and sedimentation rate for indications of infection, dehydration
     d. TSH low in hyperthyroidism
• Management/treatment
  1. Nonpharmacologic
     a. Observation—acute diarrhea usually self-limited
     b. Hydration/electrolyte replacement
     c. Normal diet as soon as patient able to tolerate
     d. For lactase deficiency, limit milk products and consider exogenous lactase
  2. Pharmacologic
     a. Antimotility agents—loperamide, diphenoxylate/atropine
        (1) Drug action—slows intestinal transit, allowing more time for absorption
        (2) Contraindications/precautions
           (a) May have anticholinergic effects
           (b) Use contraindicated if patient has bloody diarrhea, acute dysentery, ulcerative colitis
           (c) Animal reproduction studies have not shown any adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus
     b. Antisecretory agents—bismuth subsalicylate
        (1) Drug action—may involve adsorption of bacterial toxins and/or local anti-inflammatory effect
        (2) Contraindications/precautions
           (a) May potentiate oral anticoagulants and hypoglycemic agents
           (b) Avoid use if hypersensitivity to salicylates
           (c) Not recommended during pregnancy because of salicylate component
     c. Antibiotics
        (1) Indicated only when pathogen identifiable
        (2) May exacerbate simple episode
        (3) Traveler’s diarrhea—ciprofloxicin or trimethoprim-sulfamethoxazole for three days
  3. Patient education
     a. Maintain adequate fluid intake
     b. Normal diet when tolerated
     c. Limit use of antidiarrheal agents
     d. Prevention of traveler’s diarrhea
        (1) Don’t drink tap water or use tap water for brushing teeth or as ice in drinks
        (2) Don’t eat raw fruits and vegetables unless you have to peel them
        (3) Don’t drink unpasteurized milk or milk products
        (4) Don’t eat raw or rare cooked meats or fish
  • Indications for referral
    1. Blood in stools
    2. Diarrhea accompanied by severe abdominal pain
    3. Worsening symptoms
    4. Definitive diagnosis and management of underlying disease

Hemorrhoids
• Definition—varicosities of the hemorrhoidal plexus in lower rectum or anus
  1. Internal
     a. Originate above the anorectal line
     b. Covered by nonsensitive rectal mucosa
  2. External
     a. Originate below the anorectal line
     b. Covered by well-innervated epithelium
• Etiology/incidence/risk factors
  1. Etiology
     a. Thin-walled, dilated vessels; engorge with increased intra-abdominal pressure
     b. Prolapse may be secondary to passage of a large, hard stool; increase in venous pressure from pregnancy or heart failure; straining due to lifting or defecation
  2. One of the most commonly encountered anorectal conditions in general practice
  3. Risk factors
     a. Constipation, straining at stool
     b. Pregnancy
     c. Low-fiber diet
     d. Pelvic congestion
     e. Poor pelvic musculature
     f. Loss of muscle tone with advanced age
• Symptoms
  1. Internal—painless, bright red bleeding with defecation
  2. External—itching, pain, and bleeding with defecation
• Physical findings
  1. Internal
     a. Usually not palpable unless thrombosed
     b. Usually not visible unless prolapsed
  2. External
     a. Protrude with straining or standing
     b. Blue, shiny masses at the anus if thrombosed
     c. Painless, flaccid skin tags (resolved thrombotic hemorrhoids)
• Differential diagnosis
  1. Condyloma accuminata
  2. Rectal prolapse
  3. Rule out other causes for bleeding
     a. Colorectal cancer
     b. Polyps
     c. Anal fissures
     d. Inflammatory bowel disease
     e. Colonic diverticulitis
• Diagnostic tests/findings
  1. Anoscopic examination—with internal hemorrhoids, bright red to purplish bulges
  2. Additional testing if underlying pathology suspected
• Management/treatment—no treatment necessary if asymptomatic
  1. Nonpharmacologic
     a. Increase bulk/fiber/fluids in diet
     b. Sitz baths
     c. Witch hazel pads or gel—may provide transient relief and help reduce inflammation
2. Pharmacologic
   a. Topical anesthetic/steroid suppositories and ointments
      (1) Drug action—anesthetic and anti-inflammatory action
      (2) Contraindications/precautions—may be used during pregnancy
   b. Bulk-forming agents (see "Constipation" section in this chapter)
   c. Stool softeners (see "Constipation" section in this chapter)
3. Patient education
   a. Regulation of bowel habits
   b. Dietary changes to maintain hydration, bulk
   c. Appropriate use of bulk laxatives, stool softeners, hemorrhoidal preparations

• Referral
  1. Acute thrombosis of an external hemorrhoid
  2. Failure to respond to conservative management

Irritable Bowel Syndrome (IBS)

• Definition
  1. A chronic functional disorder characterized by altered bowel habits and abdominal pain
2. Rome III Criteria for Diagnosis of IBS (Longstreth, Thompson, Chey, Houghton, Mearin, & Spiller, 2006)—recurrent abdominal pain or discomfort at least three days per month in the previous three months
   a. Associated with two or more of the following:
      (1) Improvement with defecation
      (2) Onset associated with change in stool frequency
      (3) Onset associated with change in stool form
   b. One or more of the following symptoms on at least 25% of occasions for subgroup identification (constipation IBS, diarrhea IBS, mixed/alternating IBS)
      (1) Abnormal stool frequency—less than three times per week or more than three times per day
      (2) Abnormal stool form—lumpy/hard or loose/watery
      (3) Abnormal stool passage—straining, incomplete evacuation
      (4) Bloating, feeling of abdominal distention
      (5) Passage of mucus

• Etiology/prevalence/risk factors
  1. Etiology—proposed
     a. Altered bowel motility
     b. Visceral hypersensitivity
     c. Imbalance of neurotransmitters
  2. Prevalence—as high as 15% in general population; female to male ratio 2:1; onset usually late teens, early adulthood

• Symptoms
  1. Refer to Rome criteria
  2. Presence of the following symptoms suggest organic disease (alarm symptoms)
     a. Pain/diarrhea that interferes with sleep
     b. Recurrent nausea and vomiting
     c. Evidence of GI bleeding
     d. Unintentional weight loss (> 10% of ideal body weight)
     e. Persistent diarrhea or severe constipation

• Physical findings—mild left-lower quadrant (LLQ) tenderness on abdominal examination
• Differential diagnosis
  1. Food intolerance—lactose, fructose, sorbitol
  2. Colon cancer
  3. Infectious disease/parasitic infestation (Giardia)
  4. Inflammatory disease (ulcerative colitis, Crohn’s disease)
  5. Laxative abuse
• Diagnostic tests/findings
  1. Not indicated for patients who are younger than age 50 years, meet Rome criteria, normal physical examination, lacking alarm symptoms
  2. Consider the following dependent on other history or physical examination findings
     a. CBC, chemistry panel, sedimentation rate
     b. Stool studies including fecal leukocytes, occult blood, ova, and parasites
     c. Flexible sigmoidoscopy
  3. Colonoscopy if patient older than 50 years, weight loss, anemia, evidence of GI bleeding, or risk factors for colon cancer or inflammatory bowel disease

• Management/treatment
  1. Nonpharmacologic
     a. Reassurance of benign nature of disease
     b. Diet
        (1) Decrease caffeine, alcohol, fatty foods, gas-forming foods, or products containing sorbitol; limit dairy products if lactose intolerance suspected
        (2) Increase fiber in diet or in the form of supplements if patient has constipation-IBS
     c. Stress management, relaxation techniques, identification of triggers
     d. Regular physical activity
     e. Probiotics—they theorized that they may ameliorate IBS symptoms by stimulating immune response, reducing inflammation, altering composition of gut flora
  2. Pharmacologic—use patient's symptoms as a guide
     a. Pain predominant
        (1) Antispasmodic/anticholinergic—dicyclomine hydrochloride, L-hyoscyamine sulfate
           (a) Drug action—selectively inhibits gastrointestinal smooth muscle and may reduce pain and bloating
           (b) Contraindications/precautions
           (c) May cause drowsiness, anticholinergic effects
           (d) Do not use if patient has glaucoma, unstable cardiovascular disease, GI or urinary tract obstruction
           (e) Animal reproduction studies have not shown any adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus
        (2) Tricyclic antidepressants—amitriptyline, nortriptyline, desipramine
           (a) Drug action—analgesic and mood-enhancing properties; anticholinergic effects
Acute appendicitis secondary to obstruction due to fecal mate
Contraindications/precautions
Anorexia, nausea, or vomiting
Patient education
Ovarian (e.g., mittelschmerz, cyst)
Patient education
Gallbladder or pancreatic inflammation
Discontinue immediately in patients who develop
Fiber supplements—psyllium, polycarbophil, methylcellu
Constipation predominant
Ectopic pregnancy
Referral—immediate surgery; consult for acute abdomen

(i) Contraindications/precautions
   i. May have anticholinergic effects
   ii. Do not use during or within 14 days of MAO inhibitors
   iii. Do not use postacute MI
   iv. Animal reproduction studies have shown an adverse effect on the fetus and there are no adequate
      and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus
b. Diarrhea predominant
   (1) Loperamide, diphenoxylate/atropine (see “Diarrhea” section in this chapter)
   (2) Alosetron
      (a) Drug action—a 5-HT₃ receptor antagonist, decreases intestinal secretion, motility, and afferent pain signals
      (b) Limited use for women with severe chronic diarrhea predominant IBS; unresponsive to conventional therapy and not caused by anatomic or metabolic abnormality
   (c) Contraindications/precautions
      i. May have severe adverse GI effects, including ischemic colitis and serious complications of constipation that could result in hospitalization and rarely blood transfusion, surgery, and death
      ii. Only healthcare providers enrolled in Lotronex (alosetron) prescribing program should prescribe
      iii. Discontinue immediately in patients who develop constipation or symptoms of ischemic colitis
      iv. Animal reproduction studies have not shown any adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus
c. Constipation predominant
   (1) Fiber supplements—psyllium, polycarbophil, methylcellulose (see “Constipation” section in this chapter)
   (2) Osmotic laxative—lactulose, sorbitol, polyethylene glycol, magnesium hydroxide (see “Constipation” section in this chapter)
   (3) Lubiprostone (see “Constipation” section in this chapter)
3. Patient education
   a. Appropriate implementation of the nonpharmacologic measures
   b. Reassurance of the relative benign nature of disorder
   c. Need for reevaluation if symptoms progress or change
   • Referral—onset in those older than 50 years; presence of symptoms suggestive of organic disease/alarm symptoms

Appendicitis
• Definition—inflammation of the wall of the vermiform appendix that may result in perforation with subsequent peritonitis
• Etiology/incidence
  1. Etiology
     a. Based on operative findings, classified as simple, gangrenous, or perforated
b. Acute appendicitis secondary to obstruction due to fecal material, lymphoid hyperplasia, foreign bodies, or parasites with secondary bacterial infection
c. Gangrene and perforation develop within 24–36 hours; perforation results in release of luminal contents into peritoneal cavity
2. Incidence—occurs in all age groups; highest incidence in males 10–30 years of age
   • Symptoms—classic sequence of symptoms
      1. Pain is initial symptom; begins in epigastrum or periumbilical area
      2. Anorexia, nausea, or vomiting
      3. Pain localizes to right lower quadrant (RLQ) after several hours
      4. Sense of constipation; infrequently diarrhea
   • Physical findings
      1. Fever of 99–100°F (> 100°F may indicate peritonitis)
      2. Tenderness localized to McBurney’s point; pain worsened and localized with cough
      3. Signs of peritoneal irritation—guarding, rigidity, and rebound tenderness RLQ
      4. Absent bowel sounds
      5. Positive psoas sign—pain with flexion at the hip against resistance or hyperextension
      6. Positive Rovsing’s sign—RLQ pain elicited when LLQ is deeply palpated and pressure is released
      7. Positive obturator sign—pain with passive internal rotation of flexed right hip/knee
      8. Rectal examination may reveal tenderness/mass
• Differential diagnosis
   1. Ovarian (e.g., mittelschmerz, cyst)
   2. Ectopic pregnancy
   3. Pelvic inflammatory disease
   4. Pyelonephritis, calculi
   5. Gallbladder or pancreatic inflammation
   6. Gastroenteritis
• Diagnostic tests/findings
   1. WBC count—moderate leukocytosis 10,000–18,000/mm³
   2. Pregnancy test—rule out ectopic pregnancy
   3. Ultrasound diagnostic in 85% of patients
   4. Focused appendix computerized tomography (FACT)—highly specific and sensitive but time and expense limit usefulness in routine diagnosis
• Management/treatment
   1. Nonpharmacologic—none
   2. Pharmacologic—none
   3. Patient education
      a. Need for emergency care if pain or other symptoms change during observation, evaluation period
      b. Postoperative care instructions
   • Referral—immediate surgery; consult for acute abdomen
**Peptic Ulcer Disease (PUD)**

- **Definition**—chronic mucosal ulcerative disorder involving the upper GI tract (stomach or duodenum); imbalance both in amount of acid–pepsin production and ability of gastric and duodenal mucosa to protect itself

- **Etiology/incidence/risk factors**
  1. **Etiology**
     a. Acid and pepsin activity overpower mucosal defenses to produce ulcers when mucosal defense is impaired by exogenous factors/Helicobacter pylori, and NSAIDs
     b. *H. pylori* is an established causative factor; 90–95% of duodenal ulcer patients and 70–80% of gastric ulcer patients infected with *H. pylori*
     c. *H. pylori* is a Gram-negative bacterium; produces urease that breaks down urea-forming ammonia and CO₂, allowing organism to control pH of its environment
     d. NSAIDs damage mucosa through a direct action and systemically by inhibiting endogenous prostaglandin synthesis; NSAID-related ulcers more likely to be gastric
  2. **Incidence**
     a. Estimated 5–10% of the general population
     b. Male/female ratio nearly equal
     c. Duodenal ulcers more common, with peak incidence at 25 to 55 years of age; peak incidence of gastric ulcers at 55 to 65 years of age
  3. **Risk factors**
     a. Family history
     b. Cigarette smoking—delays healing and increases risk of recurrence
     c. Medications—corticosteroids, NSAIDs
     d. Alcohol use—delays healing and increases risk of recurrence

- **Symptoms**
  1. Burning or deep epigastric pain that occurs one to three hours after meals; relieved by ingestion of food or antacids
  2. Pain commonly causes early morning awakening
  3. Other dyspeptic symptoms—nausea, vomiting, belching, bloating
  4. Symptomatic periods occur in clusters lasting a few weeks, followed by symptom-free periods for weeks/months
  5. Gastric ulcer presentation more variable; food may make symptoms worse
  6. Complications—hemorrhage, perforation, obstruction
  7. Alarm symptoms for gastric cancer or complicated PUD
     a. Bloody or black stools
     b. Unintended weight loss
     c. Dysphagia
     d. Persistent, severe epigastric or stomach pain
     e. Bloody or coffee-ground-type vomit

- **Physical findings**
  1. Usually none in uncomplicated peptic ulcer disease
  2. Occasionally, well-localized epigastric tenderness

- **Differential diagnosis**
  1. Gastroesophageal reflux disease
  2. Nonulcer dyspepsia

- **Contraindications/precautions**
  1. Stool for occult blood—positive if bleeding present
  2. *H. pylori* testing
     a. Unless indications for endoscopy, use serology to identify infection and stool antigen test or urea breath test to determine cure if indicated
     1. Serologic test—ELISA detects IgG antibodies, indicating current or past infection; may or may not revert to negative after treatment
     2. Stool antigen test—reverts to negative within five days/few months after eradication of organism
     3. Urea breath test—detects presence or absence of active infection
  3. CBC with differential
  4. Mucosal biopsy during endoscopy indicated if age older than 50 years, alarm symptoms, family history of gastric cancer, no improvement with treatment

- **Management/treatment**
  1. Nonpharmacologic
     a. Avoid aspirin and NSAIDs
     b. Smoking cessation
     c. Decrease alcohol intake
     d. Decrease intake of any identified irritants that make symptoms worse—coffee, caffeine, spicy foods
     e. Use stress management, relaxation techniques
  2. Pharmacologic
     a. Disease not due to *H. pylori*
        1. Histamine 2 receptor antagonists (H₂RA)—cimetidine, ranitidine, nizatidine, famotidine
           a. Drug action—inhibits acid secretion by blocking H₂ receptors in parietal cell
           b. Contraindications/precautions
              i. May alter absorption of some drugs secondary to changes in gastric pH
              ii. Contraindicated with renal insufficiency or hepatic impairment
              iii. Animal reproduction studies have not shown any adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus
        2. Proton pump inhibitors (PPIs)—omeprazole, lansoprazole, rabeprazole, pantoprazole, esomeprazole
           a. Drug action—inhibits gastric acid secretion by altering the activity of the proton pump; virtual cessation of acid production
           b. Contraindications/precautions
              i. May alter absorption of some drugs secondary to changes in gastric pH
              ii. Animal reproduction studies have not shown any adverse effects on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus
Viral Hepatitis

- Definition—a group of systemic infections involving the liver with common clinical manifestations caused by different viruses with distinctive epidemiologic patterns

- Etiology/incidence/risk factors

1. Hepatitis A virus (HAV)
   a. Spread via fecal–oral route by person-to-person contact or eating and/or drinking contaminated food and/or water; spreads readily in households and child-care centers
   b. Mean incubation time 25 days; range 15 to 60 days; maximum infectivity two weeks before jaundice; acute onset
   c. Infections in infancy and childhood generally mild without jaundice; adult infections can be severe
   d. Self-limited; no carrier state or chronic liver disease results
   e. Accounts for up to one-third of acute viral hepatitis cases

2. Hepatitis B virus (HBV)
   a. Transmitted via percutaneous or mucosal contact with infectious blood or body fluids (saliva, vaginal secretions, semen) by parenteral, sexual, perinatal exposure
   b. Mean incubation time 75 days; range 28 to 160 days
   c. Spectrum of illness ranging from asymptomatic seroconversion to acute illness; fulminant hepatitis results in less than 1%
   d. Up to 10% infected as adults and 90% infected as neonates become chronic carriers; increased risk of cirrhosis, hepatocellular carcinoma

3. Hepatitis C virus (HCV)
   a. Transmitted most efficiently via large or repeated percutaneous exposure to infected blood through transfusion prior to 1992 or IV drug use; transmitted much less frequently through occupational, sexual, or perinatal exposures; most common chronic bloodborne infection in the United States
   b. Mean incubation time 50 days; range 2 to 22 weeks; onset insidious
   c. Acute disease often mild in adults; asymptomatic in children
   d. Up to 80% of infected individuals develop chronic hepatitis; 20–30% eventually develop cirrhosis or hepatocellular carcinoma

4. Hepatitis D virus (HDV)
   a. An incomplete virus that requires the helper function of HBV to replicate
   b. Transmitted via percutaneous or mucosal exposure to infectious blood as a co-infection with HBV or superinfection in person with HBV
   c. Incubation period for superinfection is two to eight weeks
   d. Contributes to severity of HBV infection
   e. Suspect superinfection with HDV in patient who presents with fulminant hepatitis and chronic HBV

5. Hepatitis E virus (HEV)
   a. Spread via fecal–oral route
   b. Endemic in developing countries
   c. Mean incubation time 27 days; range two to nine weeks
   d. More common in children and young adults; infection during pregnancy can lead to liver failure
   e. No risk of chronicity or carcinoma

6. Miscellaneous viral causes
   a. Herpes simplex virus
   b. EBV
   c. CMV

- Symptoms—all viral types produce very similar syndromes; severity of illness can vary widely

1. Phase 1—incubation
   a. Asymptomatic
   b. Weeks to months

2. Phase 2—preicteric (prodromal)
   a. Three to 10 days in length
   b. Malaise, fatigue
   c. Anorexia, nausea, vomiting
   d. Flu-like aches, headache
   e. Skin rash
   f. Change in sense of smell or taste; aversion to cigarettes

3. Phase 3—icteric
   a. One to four weeks in length
   b. Right upper quadrant (RUQ) pain
   c. Dark-colored urine
   d. Clay-colored stools
   e. Jaundice of skin, sclera, nail beds

4. Phase 4—convalescence
   a. May last weeks to months
   b. Chronic disease develops in certain types
   c. Hepatitis B, C, D may be fatal; HEV 10–20% mortality rate in pregnant women

- Physical findings

1. Rash—maculopapular and urticarial lesions
2. Low-grade fever
3. Slight jaundice, yellow sclera
4. Hepatomegaly
5. Splenomegaly

- Differential diagnosis—noninfectious causes of hepatitis (e.g., hepatotoxic drugs, alcohol)
**Table 10-6  Serologic Diagnosis and Markers of Active or Chronic Hepatitis**

<table>
<thead>
<tr>
<th>Test Name</th>
<th>HAV</th>
<th>HBV</th>
<th>HCV</th>
<th>HDV</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAV IgM antibody</td>
<td>Positive: current or recent infection</td>
<td>N.A. (not applicable)</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>HAV total antibody</td>
<td>Positive: indicates immunity in absence of positive HAV IgM</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>HBV surface antigen</td>
<td>N.A.</td>
<td>Positive: acute and chronic infection</td>
<td>N.A.</td>
<td>Positive with HBV/HDV co-infection or superinfection</td>
</tr>
<tr>
<td>HBV surface antibody</td>
<td>N.A.</td>
<td>Positive: resolution and immune</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>HBV core IgM antibody</td>
<td>N.A.</td>
<td>Positive: acute infection, resolves in four to six months</td>
<td>N.A.</td>
<td>Positive with HBV/HDV co-infection or superinfection</td>
</tr>
<tr>
<td>HBV e antigen</td>
<td>N.A.</td>
<td>Positive: resolving infection or response to therapy</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>HBV DNA</td>
<td>Positive: active infection</td>
<td>N.A.</td>
<td>Positive with HBV/HDV co-infection or superinfection</td>
<td></td>
</tr>
<tr>
<td>HCV antibody</td>
<td>N.A.</td>
<td>N.A.</td>
<td>Positive: late in acute and in chronic infection</td>
<td>N.A.</td>
</tr>
<tr>
<td>HCV RNA</td>
<td>N.A.</td>
<td>N.A.</td>
<td>Positive: confirms current infection</td>
<td>N.A.</td>
</tr>
<tr>
<td>HDV antibody</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>Positive with positive HBV surface antigen, current or past HBV/HDV co-infection or superinfection</td>
</tr>
<tr>
<td>HDV IgM antibody</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>Positive with positive HBV surface antigen, current or past HBV/HDV co-infection or superinfection. Negative: resolved HDV infection</td>
</tr>
</tbody>
</table>

• Diagnostic tests/findings
  1. Viral serologies (see Table 10-6)
  2. Urinalysis—positive for protein, bilirubin
  3. LFTs
     a. Marked elevation—alanine aminotransferase (ALT) and aspartate aminotransferase (AST)
     b. Mild increase or normal lactate dehydrogenase (LDH), serum bilirubin, alkaline phosphatase, prothrombin time

• Management/treatment
  1. Nonpharmacologic
     a. Activity as tolerated; avoid strenuous activities or contact sports
     b. Hydration
     c. Maintain adequate caloric intake and balanced diet; small feedings may be better tolerated
     d. Discontinue all but essential medications
     e. Avoid alcohol
  2. Pharmacologic
     a. Antiemetics if indicated for nausea
     b. Chronic hepatitis B—recombinant interferon α-2b; direct inhibitor of HBV replication; treatment rarely produces permanent remission of disease
     c. Chronic hepatitis C—combination therapy with pegylated interferon and ribavirin; treatment is complex, and guidelines change frequently
  d. Prevention
     1. HAV
        (a) Immune globulin—recommended for travelers going to countries for longer than six months where HAV is endemic; give as prophylaxis within two weeks of known exposure
        (b) HAV vaccine
     2. HBV
        (a) Hepatitis B Immune Globulin (HBIG)—give as prophylaxis to infants born to HBsAg-positive women; give within 14 days of sexual exposure
        (b) HBV vaccine
  3. Patient education
     a. Careful disposal of infected wastes
     b. Scrupulous handwashing, food-handling techniques
     c. Need for prophylactic immunization of contacts, household members
     d. Safer sexual practices
     e. Avoidance of blood contamination—no sharing toothbrushes, razors, needles
     f. Laboratory follow-up
        1. Monitor aminotransferase at one- to four-week intervals during acute illness
        2. Monitor HBsAg and anti-HBsAg until anti-HBs present with HBV infection
Differential diagnosis

1. Appendicitis
2. Pancreatitis
3. Ruptured ectopic pregnancy or ovarian cyst
4. Peptic ulcer disease

Diagnostic tests/findings

1. Ultrasound
   a. Has a 95% sensitivity for detecting stones in the gallbladder; detects bile duct stones in only 50% of cases
   b. Best noninvasive imaging technique to diagnose acute cholecystitis
2. Computerized tomography (CT), magnetic resonance imaging (MRI), cholescintigraphy, endoscopic retrograde cholangiopancreatography (ECP) possible follow-up tests based on ultrasound and lab test findings
3. ECG if cardiac risk factors or cardiac involvement suspected; chest radiograph to rule out pneumonia
4. Pregnancy test if indicated prior to any teratogenic imaging studies
5. CBC with differential—mild leukocytosis with a "left shift" observed in acute cholecystitis
6. LFTs—elevation of serum bilirubin and alkaline phosphatase with bile duct stones
7. Pancreatic enzymes—increased amylase and lipase associated with concomitant pancreatitis

Management/treatment

1. Expectant management for patients with asymptomatic gallstones
2. Initial management of symptomatic gallstones may include IV rehydration and correction of electrolyte imbalance, anti-spasmodic and antiemetic medications, injected nonsteroidal anti-inflammatory prostaglandin inhibitor for pain
3. Elective cholecystectomy for most patients with symptomatic gallstones
4. Acute cholecystitis managed with hospital admission; cholecystectomy once patient is stable
5. Bile duct stones should be removed whether symptomatic or not because of high rate of complications

Gastroesophageal Reflux Disease (GERD)

Definition

1. Gastroesophageal reflux refers to movement of gastric contents from the stomach into the esophagus
2. GERD refers to symptomatic clinical condition or histologic alteration that results from episodes of reflux
3. When esophagus is repeatedly exposed to refluxed material for prolonged periods of time, inflammation of esophagus can occur
4. Complications—esophagitis; strictures; Barrett's esophagus, which carries a 10% risk of progression to adenocarcinoma

Etiology/incidence/risk factors

1. Etiology
   a. Contributing factors include reflux of caustic gastric contents, a breakdown in defense mechanism of esophagus, and a functional abnormality that results in reflux
2. Diagnostic evaluation if symptoms chronic or refractory to therapy or if esophageal complications suspected
   a. Endoscopy
      (1) Useful for diagnosis of complications—esophagitis, strictures, Barrett’s esophagus
   (2) Indications
      (a) Dysphagia or odynophagia
      (b) Unplanned weight loss
      (c) Evidence of GI bleeding or iron-deficiency anemia
      (d) Screen for Barrett’s if 10 years or more of GERD symptoms
   b. Upper GI may demonstrate structural problems; evaluation of dysphagia
   c. Ambulatory esophageal pH monitoring—best test to establish abnormal acid reflux

• Management/treatment
  1. Nonpharmacologic—target to specific patient circumstances
     a. Weight loss if obese
     b. Smoking cessation
     c. Elevate head of bed (HOB); sleep on wedge-shaped bolster if have nocturnal symptoms
     d. Avoid recumbency for three hours after eating if symptoms worse when supine
     e. Reduce fat to no more than 30% of calories
     f. Reduce consumption of alcohol, chocolate, colas, coffee, peppermint, citrus juices, tomato products
  2. Pharmacologic
     a. Commercially available antacids are useful for mild, infrequent symptoms
     b. H₂-receptor antagonists (acid reducers)—effective treatment for less severe GERD; see the section titled “Peptic Ulcer Disease (PUD)” earlier in this chapter
     c. PPIs (acid suppressant agents)—most effective agents for healing esophagitis and preventing complications; see the section titled “Peptic Ulcer Disease (PUD)” in this chapter
  3. Patient education—lifestyle modifications

• Referral
  1. Symptoms of dysphagia, weight loss, blood loss, obstructive symptoms including nausea/vomiting, early satiety, anorexia
  2. Long-standing or refractory cases
  3. Candidates for surgical intervention

Hematologic Disorders

Anemias

• Definition
  1. Abnormally low hemoglobin concentration (< 12 g/dL for women, 13 g/dL for men)
  2. Anemia occurs as result of abnormal red blood cell (RBC) development, abnormal hemoglobin synthesis, or accelerated RBC destruction
3. Usually classified according to RBC size—mean corpuscular volume (MCV)
   a. Microcytic anemia (MCV < 80 fL) (e.g., iron-deficiency anemia, thalassemia trait)
   b. Macrocytic anemia (MCV > 100 fL) (e.g., B₁₂ deficiency, folate deficiency, liver disease, hypothyroidism)
   c. Normocytic anemia (MCV 80–100 fL) (e.g., anemia of chronic disease, hemolysis, sickle cell disease, renal failure)

• Etiology/incidence—commonly encountered anemias
  1. Iron-deficiency anemia (IDA)—microcytic, hypochromic
     a. Etiology
        (1) Slow, persistent blood loss—GI overt/occult, heavy or prolonged menstrual bleeding
        (2) Inadequate dietary intake of iron-rich foods
        (3) Metabolic demands in excess of intake—pregnancy
     b. Incidence
        (1) Most common form of anemia; represents 25% of all anemia cases
        (2) Affects 10–15% of premenopausal women
  2. Anemia of chronic disease—normochromic, normocytic
     a. Etiology
        (1) A hypoproliferative anemia associated with underlying chronic disorders such as infections, inflammatory disorders, and malignancy
        (2) Reduced production and response to erythropoietin; decreased RBC life span
        (3) Defect in iron reutilization
     b. Incidence—most common anemia in elderly population
  3. Vitamin B₁₂-deficiency anemia—megaloblastic, macrocytic, normochromic
     a. Etiology
        (1) B₁₂ deficiency alters DNA synthesis and maturation of RBCs
        (2) B₁₂ deficiency develops secondary to lack or relative deficiency of intrinsic factor that leads to impaired vitamin B₁₂ absorption (pernicious anemia)
           (a) Autoimmune reaction involving gastric parietal cells
           (b) History of gastrectomy
        (3) Rarely secondary to nutritional deficiency of vitamin—risk with strict vegan diet
     b. Incidence—usually presents around age 60; most common in Caucasians of northern European descent; familial tendency
  4. Folate-deficiency anemia—megaloblastic, macrocytic, normochromic
     a. Etiology
        (1) Folate deficiency alters synthesis of DNA and RBC maturation
        (2) Folate deficiency due to
           (a) Malabsorption syndromes
           (b) Increased demand—pregnancy
           (c) Inadequate intake—alcoholics, elderly
        (3) Certain drugs decrease folate levels—oral contraceptives (phenytoin)
     b. Incidence
        (1) Found in all races and age groups
        (2) Most common megaloblastic anemia in pregnancy
  5. Sickle cell anemia
     a. Etiology
        (1) A chronic hemolytic anemia characterized by sickle-shaped RBCs
        (2) Autosomal recessive genetic disorder
           (a) Hgb S develops instead of Hgb A
           (b) Individual is homozygous for Hgb S
     b. Incidence
        (1) Homozygous Hgb S in an estimated 0.5% of African Americans
        (2) Heterozygous trait in an estimated 8% of African Americans; asymptomatic carrier state
        (3) Prevalent in African Americans, also to lesser extent in persons of Mediterranean ancestry

• Symptoms
  1. Iron-deficiency anemia
     a. Asymptomatic unless severe, then nonspecific
     b. Fatigue, generalized weakness
     c. Dyspnea on exertion
     d. Headaches
     e. Pica
  2. Anemia of chronic disease
     a. Symptoms common to all anemias—fatigue, weakness, exertional dyspnea, lightheadedness, anorexia
     b. Other symptoms related to specific underlying disease
  3. Vitamin B₁₂-deficiency anemia
     a. None at first, insidious onset
     b. Fatigue, weakness, lightheadedness
     c. Dyspnea, palpitations
     d. GI disturbances—anorexia, bloating, diarrhea
     e. Sore tongue
     f. Neurologic—peripheral paresthesias, ataxia
     g. Loss of taste and smell
  4. Folate-deficiency anemia—symptoms similar to vitamin B₁₂-deficiency anemia except there is no neurologic involvement
  5. Sickle cell anemia
     a. Often none during remissions
     b. Vaso-occlusive crises—precipitating factors include infection, physical or emotional stress, blood loss, pregnancy, surgery, high altitudes
        (1) Malaise, chills
        (2) Pain, especially in bones, abdomen, chest, lower legs
        (3) Headaches, epistaxis, vomiting
        (4) Difficulty walking

• Physical findings
  1. Iron-deficiency anemia
     a. Often none with mild anemia
     b. Skin or conjunctival pallor
     c. Nail changes—spoon shaped (koilonychias); brittle
     d. Brittle, fine hair
     e. Tachycardia with or without systolic flow murmur
     f. Tachypnea
2. Anemia of chronic disease
   a. Ill appearance
   b. Signs of precipitating illness
3. Vitamin B<sub>12</sub>–deficiency anemia
   a. Skin pale, occasionally jaundiced
   b. Smooth, beefy-red tongue (glossitis)
   c. Tachycardia, arrhythmias, systolic flow murmur
   d. Hepatomegaly, splenomegaly
   e. Neurologic
      1. Ataxia, positive Romberg test
      2. Hyperactive reflexes
      3. Peripheral loss of sensation, decreased vibratory sense, impaired proprioception
      4. Changes in mental state with possible wide range of expression—mild confusion to acute psychosis
4. Folate-deficiency anemia
   a. Pallor and dryness of skin and mucous membranes
   b. Brittle nails; brittle fine hair
   c. Tachycardia, tachypnea
5. Sickle cell anemia
   a. In crises
      1. Temperature, pulse, respirations elevated
      2. Hypotension
      3. Pallor, cyanosis secondary to poor oxygenation
      4. Scleral jaundice
      5. Decreased skin turgor
   b. Chronic findings due to anemia, vaso-occlusive events, end organ damage
      1. Cardiomegaly
      2. Skin ulcers, especially on lower extremities
      3. Osteomyelitis
      4. Retinopathy
      5. Renal disease—hematuria

- Differential diagnosis
  1. Iron-deficiency anemia
     a. Anemia of chronic disease
     b. Thalassemia trait
     c. Sideroblastic anemia
  2. Anemia of chronic disease—diagnosis of exclusion
     a. Iron-deficiency anemia
     b. Anemia of renal disease
  3. Vitamin B<sub>12</sub>–deficiency anemia
     a. Nutritional deficiency
     b. Malabsorption
     c. Chronic alcoholism
     d. Chronic gastritis (H. pylori infection)
     e. Folate deficiency
  4. Folate-deficiency anemia
     a. Pernicious anemia
     b. Medication, toxins
  5. Sickle crises
     a. Appendicitis
     b. Acute cholecystitis
     c. Pneumonia

- Diagnostic tests/findings
  1. World Health Organization (WHO) standard for anemia diagnosis
     a. Hemoglobin 13 g/dL or less in men (approximately 38% hematocrit)
     b. Hemoglobin 12 g/dL or less in women (approximately 35% hematocrit)
  2. Severe anemia (symptomatic) generally less than 25% Hct
  3. Iron-deficiency anemia—hypochromic microcytic RBCs
     a. RBC changes in early disease may be mild
     b. MCV less than 80 fl
     c. Increased red cell width (RDW)
     d. Serum ferritin less than 10 mg/L
        1. Levels reflect iron stores; single most useful test for diagnosing IDA
        2. Ferritin is an acute-phase reactant; may be elevated in inflammatory disease
     e. Decreased reticulocyte count
  4. Anemia of chronic disease—normochromic-normocytic early in course; becomes microcytic
     a. Anemia is typically mild; hematocrit remains around 30%
     b. Normal or slightly reduced MCV
     c. Low serum iron levels; normal or low total iron-binding capacity TIBC
     d. Normal or increased serum ferritin
  5. Vitamin B<sub>12</sub>–deficiency anemia—megaloblastic-macrocytic anemia
     a. MCV greater than 100 fl
     b. Serum B<sub>12</sub> decreased; less than 100 pg/mL

### Table 10-7 Laboratory Values in Common Anemias

<table>
<thead>
<tr>
<th>Anemia</th>
<th>MCV</th>
<th>MCH</th>
<th>Serum Iron</th>
<th>TIBC</th>
<th>Ferritin</th>
<th>Vitamin B&lt;sub&gt;12&lt;/sub&gt;</th>
<th>Folate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron deficiency</td>
<td>Low</td>
<td>Low</td>
<td>Normal/Low</td>
<td>High</td>
<td>Low</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>Folate–deficiency</td>
<td>High</td>
<td>Normal</td>
<td>High</td>
<td>Normal</td>
<td>High</td>
<td>Normal</td>
<td>Low</td>
</tr>
<tr>
<td>Vitamin B&lt;sub&gt;12&lt;/sub&gt;–deficiency</td>
<td>High</td>
<td>Normal</td>
<td>High</td>
<td>Normal</td>
<td>High</td>
<td>Low</td>
<td>Normal</td>
</tr>
<tr>
<td>Anemia of chronic disease</td>
<td>Normal</td>
<td>Normal</td>
<td>Low/High</td>
<td>Normal/Low</td>
<td>Normal/High</td>
<td>Normal/Low</td>
<td>Normal/Low</td>
</tr>
</tbody>
</table>

* MCV = mean corpuscular volume; MCH = mean corpuscular hemoglobin; TIBC = total iron-binding capacity.
c. Peripheral blood smear—RBCs of widely varying size (anisocytosis) and shape (poikilocytosis)
d. Serum methylmalonic acid and homocysteine levels elevated
e. Assay for anti-intrinsic factor/parietal cell antibody—positive with autoimmune reaction; deficiency in intrinsic factor leading to malabsorption
6. Folate deficiency—megaloblastic-macrocytic anemia
   a. MCV greater than 100 fl.
   b. Serum folate less than 3 ng/mL; normal serum vitamin B₁₂
   c. Elevated homocysteine level; normal methylmalonic acid level
7. Sickle cell anemia
   a. Hgb of 7–9 g/dL; Hct 20–30%
   b. Mild leukocytosis—12,000 to 15,000/mm³
   c. Reticulocytosis 10–25%
   d. Irreversibly sickled cells on peripheral smear
   e. Platelets may be elevated
   f. Sickledex used for screening—sickle cells present in patients with disease and trait
   g. Hemoglobin electrophoresis—Hgb S/85–95% in sickle cell anemia; Hgb S/40% in sickle cell trait
• Management/treatment
  1. Iron-deficiency anemia—identify the cause of iron deficiency and correct it
     a. Nonpharmacologic
        (1) Diet with increased iron content
        (2) Hemoglobin-monitoring schedule
           (a) Check three weeks after initiation of treatment; recheck in six to eight weeks
           (b) Ongoing monitoring every three months until stable
     b. Pharmacologic
        (1) Ferrous sulfate—may need to continue therapy four to six months to replenish iron stores; may discontinue when serum ferritin exceeds 50 mg/L.
           (a) Drug action—replenishes depleted iron stores; incorporated into hemoglobin; allows the transportation of oxygen via hemoglobin
           (b) Contraindications/precautions
              i. Iron absorption may be inhibited with concurrent use of antacids or calcium supplements
              ii. Iron inhibits tetracycline absorption
              iii. Constipation and black stools are common side effects
  2. Anemia of chronic disease
     a. Nonpharmacologic—treatment of underlying disorder; transfusion if severe anemia
     b. Pharmacologic—none; iron, folic acid, and vitamin B₁₂ have not been shown to be effective
  3. Vitamin B₁₂-deficiency anemia
     a. Nonpharmacologic—none
     b. Pharmacologic
        (1) Vitamin B₁₂/cyanocobalamin—dose intramuscular (IM) injection daily for one week, then weekly until Hct is normal, then monthly for life
        (2) Cyanocobalamin nasal gel—weekly dosing; alternate maintenance therapy
        (3) Drug action—required for hematopoiesis
  • Contraindication/precautions
     (a) Alcohol decreases vitamin B₁₂ absorption
     (b) Avoid if hypersensitivity to cobalt
  4. Folate-deficiency anemia
     a. Nonpharmacologic—increased dietary sources of folic acid: legumes, leafy green vegetables, fruits, and liver
     b. Pharmacologic—folic acid
        (1) Drug action—cofactor in biosynthesis of nucleic acids needed for RBC synthesis
        (2) Contraindications/precautions
           (a) Long-term corticosteroid use increases folic acid requirements
           (b) Sulfonamides decrease absorption of folic acid
  5. Sickle cell anemia
     a. Nonpharmacologic
        (1) Treat all infections aggressively to decrease risk of crises
        (2) Maintain hydration, oxygenation
     b. Pharmacologic—maintained continuously on folic acid supplement
     c. Therapy during crisis
        (1) Hydration and adequate oxygenation
        (2) Analgesics for pain control
        (3) Antibiotics for associated infections
  6. Patient education
     a. Iron-deficiency anemia
        (1) Take iron with meals to alleviate GI distress; taking with orange juice or other vitamin C source enhances absorption
        (2) Dietary counseling to improve iron intake and overall nutrition
        (3) Need for follow-up blood monitoring
     b. Vitamin B₁₂-deficiency anemia—need for monthly supplementation
     d. Sickle cell anemia
        (1) Consider genetic counseling
        (2) Crises avoidance
           (a) Maintain good nutrition
           (b) Avoid temperature extremes
           (c) Immunizations for pneumococcus and influenza
        (3) Routine evaluation of body systems every three to six months
        (4) Report any infection symptoms
• Referral
  1. Evaluation of suspected GI blood loss
  2. Sickle cell crisis
  3. Evaluation of resistant cases

Immunologic Disorders

Human Immunodeficiency Virus (HIV) Infection

• Definition
  1. HIV infection produces a spectrum of diseases progressing from a clinically latent or asymptomatic state to a state of profound
immunosuppression, with acquired immune deficiency syndrome (AIDS) as a late manifestation.

2. Stages of HIV infection
   a. Transmission/primary HIV infection
   b. Acute HIV infection/seroconversion
   c. Asymptomatic infection/clinically latent period with or without persistent generalized lymphadenopathy (PGL)
   d. Early symptomatic infection; previously referred to as AIDS-related complex
   e. AIDS, specific clinical conditions present or CD4⁺ cell count less than 200 cells/mm³
   f. Advanced HIV infection, characterized by CD4⁺ cell count less than 50 cells/mm³

- **Etiology/incidence**
  1. Etiology
     a. HIV virus transmitted through direct contact with blood, blood products, other body fluids
     b. Methods of transmission include sexual contact, sharing needles, blood transfusions, babies born to HIV-infected mothers, occupational exposure
  2. Incidence (Centers for Disease Control and Prevention [CDC], 2016)
     a. Prevalence of HIV infection in United States estimated to be 1.2 million, with one in eight undiagnosed
     b. Gay and bisexual men, particularly young African American men, are most affected
     c. Incidence in United States has declined 19% overall in the past decade
     d. Women accounted for 19% (8,328) of diagnoses in 2014, with African American women disproportionately affected (56%)
     e. Diagnoses among women are primarily attributed to heterosexual contact (87%) or injection drug use (13%); diagnoses among all women declined 40% from 2005 to 2014
  3. Risk factors
     a. Unprotected or traumatic sexual activity (e.g., multiple partners or partners with other partners, anal intercourse, lack of condom use)
     b. Intravenous drug use, sharing needles
     c. Infant of HIV-positive mother (vertical transmission)—15–25% if woman does not receive antiretroviral therapy during pregnancy
        (1) Risk of transmission may be reduced to less than 1% if pregnant woman receives multi-agent antiretroviral therapy and has undetectable viral load at delivery
        (2) Risk of transmission greater with maternal CD4⁺ counts of less than 200 cells/mm³
     d. Transfusion of blood or blood products, artificial insemination, organ transplant recipient prior to 1985
     e. Healthcare worker or service worker exposed to blood or body fluids (e.g., needlestick injury, splash)
- **Symptoms**
  1. Acute HIV infection and seroconversion
     a. Moderate flulike syndrome two to four weeks after inoculation
     b. Fever, diarrhea, headache, oral lesions on palate, lethargy, muscle/joint pain, rash lasting two to four weeks
     c. Self-limited; patients who seek care often misdiagnosed
     d. Seroconversion usually in six to 12 weeks; may take up to six months
  2. HIV disease progression—asymptomatic infection
     a. Twelve weeks to eight or more years; period of intense battle by immune system
     b. Influenced by general physical condition, age, mitigating drug therapy
        (1) Risk of progression correlates with length of seroconversion illness
        (2) Early HIV detection improves opportunity for successful antiviral therapy
  3. Early symptomatic HIV infection
     a. Usually occurs in eight to 10 years; immune system begins to weaken
     b. Constitutional symptoms
        (1) Fatigue, headache, arthralgia, myalgia
        (2) Weight loss, anorexia, diarrhea
        (3) Fevers, night sweats, chills
     c. Occurrence of opportunistic infections
  4. Advanced disease/AIDS
     a. Usually occurs in 10 to 11 years
     b. Severe infections
  5. Opportunistic infections
     a. Caused by a spectrum of pathogens that rarely cause disease in healthy people; most occur when CD4⁺ count is less than 200 cells/mm³
     b. May be the reactivation of a previous pathogen; may have atypical presentation
     c. Causative agents include bacterial, fungal, viral, and parasitic infections
        (1) Candidiasis—mouth, vagina, penis, esophagus, large intestine, skin
        (2) Toxoplasmosis
        (3) Malignancies
        (4) Kaposi's sarcoma
        (5) Lymphoma—late manifestation of HIV
        (6) Invasive squamous cell carcinoma—cervix, vulva, anus secondary to human papillomavirus (HPV)
        (7) *Pneumocystis (carinii) jiroveci* pneumonia (PCP)—major AIDS-defining diagnosis
        (8) Tuberculosis
        (9) *Mycobacterium avium* complex (MAC)—occurs in late-stage HIV infection

- **Physical findings**—related to immunocompromised status
  1. Early findings
     a. Lymphadenopathy
     b. Dermatologic abnormalities—seborrheic dermatitis, folliculitis
     c. Oral lesions—aphthous ulcers, herpes simplex labialis, thrush, oral hairy leukoplakia
  2. As disease progresses, more frequent skin disorders, oral lesions, infections
• Differential diagnosis
  1. Lymphomas
  2. Pneumonia
  3. Tuberculosis
  4. Chronic fatigue syndrome
  5. Mononucleosis

• Diagnostic tests/findings
  1. Diagnosis—three types of HIV diagnostic tests (Centers for Disease Control and Prevention, 2014)
    a. Antibody tests—enzyme immunoassorbent assay (EIA)
       (1) Blood or oral fluid—home test, rapid test at clinical site, laboratory test
       (2) May take three to six weeks after HIV exposure to be able to detect antibodies
       (3) Ninety-seven percent will be positive within three months after exposure
       (4) Positive tests must be followed up with a confirmatory test—Western blot, p24 antigen/antibody test
    b. Combination or fourth-generation tests—p24 antigen/antibody test
       (1) Blood test usually done in laboratory; rapid test is available
       (2) Tests for both HIV antigen and HIV 1 and HIV 2 antibodies
       (3) HIV antigen detectable as early as two to six weeks after exposure; antigen detection declines as antibodies become present
       (4) Combination test is now recommended for testing done in laboratories and is becoming more common for earlier detection of infection
       (5) Combination test is now recommended as confirmatory test for any positive rapid test results
       (6) Positive combination test should be followed with FDA-approved antibody immunoassay that differentiates HIV 1 and HIV 2 antibodies
    c. Nucleic acid test (NAT)
       (1) Can detect HIV in blood within 7 to 28 days of exposure
       (2) Expensive and not routinely used except with recent high-risk exposure or possible exposure with early symptoms of HIV infection
  2. Initial laboratory tests for women with established HIV infection—stage HIV infection, screen for comorbidities, screen for risk of opportunistic infections and need for prophylaxis, establish baselines before treatment with antiretroviral (ARV) medications (U.S. Department of Health and Human Services Panel on Antiretroviral Guidelines for Adults and Adolescents, 2016)
    a. Quantitative plasma HIV RNA
       (1) Useful for predicting progression of disease by indicating viral load
       (2) Used to make decisions to initiate antiviral medications and to monitor response
    b. CD4 cell count
       (1) Indicative of immune status; predictor of disease progression
       (2) Complements viral load assay; also used to monitor response to therapy
       (3) Normal is 800 to 1,050 cells/mm³
       (4) Patients with CD4 count of 200 cells/mm³ or less are less likely to have symptoms or an AIDS-defining condition
    c. Genotypic antiretroviral drug resistance tests even if not immediately initiating antiretroviral therapy
    d. CBC with differential and platelets
    e. Chemistry panel, transaminase levels, blood urea nitrogen (BUN), creatinine, urinalysis, lipid profile, fasting blood glucose
    f. Serology for hepatitis A, B, and C
    g. Serology for CMV, syphilis, toxoplasmosis, varicella
    h. TB testing and chest radiography if indicated
    i. Chlamydia and gonorrhea tests
    j. Cervical cancer screening

• Management/treatment
  1. Nonpharmacologic
    a. Symptom management
    b. Laboratory monitoring
    c. Nutrition counseling—identify and address symptoms that may affect appetite, chewing, swallowing; support overall health and immune system function
  2. Pharmacologic
    a. Antiretroviral therapy for HIV suppression
       (1) Highly active antiretroviral therapy (HAART)—combining three or four drugs is the standard of care for treatment of HIV infection to minimize development of drug resistance and maximize therapeutic effect
       (2) Goal to reduce HIV RNA to minimal levels for as long as possible (undetectable level < 500 copies/mL)
       (3) Decisions regarding need to change therapy based on
          (a) Immunological status (CD4 count)
          (b) Virologic status (HIV RNA levels)
          (c) Opportunistic infection identification
          (d) Symptoms indicating clinical deterioration or intolerance of adverse drug effects
    b. Antiretroviral drug classes
       (1) Nucleoside reverse transcriptase inhibitors (NRTIs)—stall virus replication by providing a faulty version of building blocks needed for HIV to make copies of itself
       (2) Non-nucleoside reverse transcriptase inhibitors (NNRTIs)—bind to and disable reverse transcriptase, a protein needed for HIV to make copies of itself
       (3) Protease inhibitors (PIs)—disable protease, a protein needed for HIV to make copies of itself
       (4) Integrase strand transfer inhibitors (INSTIs)—block integrase, an enzyme HIV uses to integrate its viral DNA into the DNA of the host CD4 cell and prevent replication
       (5) Chemokine receptor antagonists (CCR5)—antagonize the CCR5 receptor that is involved in the process by which HIV enters cells
    c. HIV treatment in pregnancy is discussed in Chapter 7
  3. Patient education
    a. Natural history of HIV infection
    b. Explain modes of transmission
       (1) Discuss lifelong ability to transmit virus
       (2) Teach effective ways to reduce fluid exchange
          (a) Breastfeeding contraindicated
Pre-Exposure Prophylaxis (PrEP)
1. Combination of two antiretrovirals: tenofovir disoproxil fumarate and emtricitabine taken once daily
2. Available to persons who are HIV negative but have increased risk of exposure to HIV through sexual and/or injection drug use
3. Reduces transmission risk up to 92%
4. Laboratory tests for prospective PrEP recipients include HIV testing, HBV screening, and renal function tests
5. PrEP medications also suppress replication of HBV; reactivation of HBV infection if discontinue or take PrEP inconsistently
6. Contraindications/precautions
   a. May have loss of appetite; mild gastric upset; mild headaches initially
   b. May cause increased serum concentrations of acyclovir, valacyclovir, aminoglycosides
   c. Do not use if HIV positive
   d. Contraindicated with severe renal function disorders
   e. FDA approved for use during pregnancy
7. Patient instructions
   a. Must take consistently for effectiveness
   b. Not immediately effective because it reaches maximum intracellular concentration in about 20 days
   c. Important to use safer sex practices to reduce HIV infection risks
   d. Follow-up every three months—repeat HIV testing, renal function tests every six months

Systemic Lupus Erythematosus (SLE)
- Definition—chronic, inflammatory, multisystem disorder of the immune system characterized by periods of remission and exacerbation; course of disease unpredictable and highly variable
- Etiology/incidence/risk factors
  1. Etiology
     a. An autoimmune disorder—abnormal immune response creates antibodies to normal tissue; familial connection
     b. Associated with reaction to some medications—chlorpromazine, hydralazine, isoniazid, methyldopa
     c. Criteria for diagnosis—four of 11 criteria to make diagnosis according to American College of Rheumatologists (Petri, 2005)
        (1) Malar rash
        (2) Discoid rash
        (3) Photosensitivity
        (4) Oral ulcers
        (5) Arthritis involving two or more peripheral joints
        (6) Serositis—pleuritis, pericarditis, or peritonitis
        (7) Renal disorder involving proteinuria or cellular casts
        (8) Neurologic disorder involving seizures or psychoses
        (9) Hematologic disorders—hemolytic anemia, leukopenia, thrombocytopenia
        (10) Positive antinuclear antibody (ANA) test
        (11) Positive other immunologic test—anti-double-stranded DNA (anti-dsDNA), anti-Smith (anti-Sm), LE (lupus erythematosus) cell preparation, false-positive syphilis serology
  2. Incidence/prevalence
     a. Approximately five per 100,000 individuals each year in United States
     b. Primarily affects women of childbearing age
     c. Approximately 250,000 definite cases of SLE in United States
     d. Prevalence much higher in African American women (one in 250) and Hispanic women (100 in 100,000) than in Caucasian women (12 to 39 in 100,000)
• Symptoms
  1. Early symptoms—vague, nonspecific, frequently misdiagnosed
  2. Constitutional—fever, fatigue, weight loss
  3. Arthralgia, arthritis
  4. Photosensitivity
  5. Headache, seizures
• Physical findings
  1. Malar rash—erythematous, flat or raised rash over malar eminences
  2. Discoid rash—erythematous raised patches with scaling
  3. Alopecia
  4. Mucosal ulcers
  5. Pleurisy
  6. Pericarditis
• Differential diagnosis
  1. Contact dermatitis, eczema
  2. Rheumatoid arthritis
  3. Infectious processes
  4. Chronic fatigue syndrome
• Diagnostic tests/findings
  1. ANA positive in 95% of cases
  2. Anti-dsDNA, anti-Sm, LE cell prep, biologic false-positive VDRL
  3. CBC—anemia, leukopenia, lymphopenia, thrombocytopenia
  4. Serum creatinine to assess kidney function
  5. Urinalysis to determine presence of hematuria, cellular casts, and proteinuria
  6. Antiphospholipid antibodies (anticardiolipin IgG or IgM or lupus anticoagulant); 30–50% of individuals with SLE have positive antiphospholipid antibodies
• Management/treatment
  1. Nonpharmacologic
    a. Moderate physical activity
    b. Adequate rest to avoid fatigue
    c. Protection from direct sunlight
    d. Proper diet and nutrition—low fat, low cholesterol, adequate vitamin D and calcium
    e. Avoiding medications that induce or aggravate symptoms
  2. Pharmacologic
    a. Treatment is generally symptomatic and variable
    b. NSAIDs—for fever, joint pain, serositis
    c. Topical corticosteroids—low-dose for skin lesions
    d. Oral or IV glucocorticoids—for major organ involvement
    e. Hydroxychloroquine
      (1) Drug action—antimalarial drug; may help treat lupus rashes and joint symptoms; evidence that it may decrease flares and organ damage with long-term use
      (2) Contraindications/precautions
        (a) Avoid use with hepatic dysfunction, alcoholism
        (b) Continue as needed at lowest therapeutic dose during pregnancy
    f. Anticoagulants may be indicated if patient has antiphospholipid syndrome
  3. Patient education
    a. Sunscreen, protective clothing to avoid ultraviolet (UV) light
    b. Relaxation, stress reduction
    c. Individualized exercise/rest program
    d. Prompt treatment of infections
    e. Effective contraception
      (1) Many women with SLE are good candidates for most contraceptive methods
      (2) Combination hormonal contraceptives are Category 4, progestin-only contraceptives Category 3, and LNG-IUS Category 3 if positive or unknown antiphospholipid antibodies; associated with higher risk for both arterial and venous thrombosis
      (3) Initiation but not continuation of DMPA or copper IUC is Category 3 if patient has severe thrombocytopenia
  f. Preconception/intraconception care
      (1) Pregnancy outcomes best when mother has been in remission for at least six months prior to pregnancy and has normal renal function
      (2) Medication management and adjustments ideally done prior to pregnancy
      (3) Risk of discontinuation of a medication may be more organ damage affecting both mother and fetus
  g. Careful supervision of obstetric care
      (1) Increased risk for premature delivery, spontaneous abortion, intrauterine fetal death, intrauterine growth restriction, pregnancy induced hypertension, venous thromboembolism, postpartum hemorrhage
      (2) Exacerbation of symptoms may occur—usually mild to moderate in severity
      (3) Pregnancy outcomes best when mother has been in remission for at least six months prior to pregnancy and has normal renal function
  h. Avoidance of surgery, dental procedures when SLE symptoms present
  i. Immunizations
    (1) Pneumococcal vaccine, meningococcal vaccine, annual influenza vaccine
    (2) Live vaccines not advisable
  j. Vitamin D supplementation
• Referral
  1. Evaluation of new symptoms, exacerbations
  2. When invasive procedures are indicated
  3. Social services, family or individual counseling regarding chronic disease coping strategies

**Rheumatoid Arthritis (RA)**

• Definition—chronic multisystem disease characterized by symmetric joint inflammation, loss of normal synovial joint anatomy and mobility, pain
  1. Classification criteria for rheumatoid arthritis (American College of Rheumatology, 2010)
    a. Score-based algorithm with total score of 6 out of 10 needed in four categories (A–D) for classification of patient as having definite RA
    b. A – joint involvement – score 0–5 dependent on number and size of joints with clinical synovitis (stiffness, swelling)
• Diagnostic tests/findings
1. Rheumatoid factor
   a. Positive in 70–80% of patients with RA; may not be positive in early disease
   b. Not specific to RA
2. Anti-citrullinated protein antibody
   a. Higher specificity for RA than rheumatoid factor
   b. Similar or higher sensitivity; present in 40% of people with negative rheumatoid factor
3. Erythrocyte sedimentation rate—may be elevated; not useful in diagnosis or prognosis
4. Radiography—joint erosion, narrowing of joint space; may not be evident in early disease

• Management/treatment
1. Major goals
   a. Reduce joint inflammation
   b. Manage pain
   c. Prevent joint destruction deformities
2. Nonpharmacologic
   a. Physical therapy, occupational therapy, hydrotherapy
   b. Rest
   c. Exercise
   d. Assistive devices
      (1) Footwear—orthotics
      (2) Canes, crutches
      (3) Splints, braces
   e. Surgery—replacement of destroyed joints
3. Pharmacologic
   a. Disease-modifying antirheumatic drugs (DMARDs)—nonbiologic
      (1) Drug action—interruption of inflammatory and immune-regulating pathways; slow disease progression; no analgesic effect
      (2) Methotrexate is most commonly used as mainstay for individuals with moderate to severe RA
         (a) Avoid use with immunodeficiency, blood dyscrasias, alcoholism, chronic liver disease
         (b) Contraindicated during pregnancy
      (3) Other nonbiologic DMARDs—hydroxychloroquine, leflu- nomide, sulfasalazine
   b. DMARDs—biologic (anti-TNF-alpha agents)
      (1) Drug action—block activity of pro-inflammatory cytokines; decrease pain, improve physical function, reduce bone erosion
         (a) Commonly used for individuals with toxicity, failure, or intolerance of nonbiologic DMARDs but may be used as initial therapy for individuals with severe RA
         (b) When used as monotherapy, has more rapid onset of action and as effective as methotrexate
         (c) Combination with methotrexate or other non-biologic DMARD may be considered
         (d) Infliximab recommended for combined therapy with methotrexate; adalimumab and etanercept may be used as monotherapy or with DMARDs

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3. Complications
   a. Macrovascular
      (1) Coronary artery disease
      (2) Myocardial infarction; sudden cardiac death
      (3) Cerebrovascular disease
      (4) Peripheral vascular disease
      (5) Intestinal ischemia
      (6) Renal artery stenosis
   b. Microvascular
      (1) Retinopathy
      (2) Nephropathy
      (3) Peripheral neuropathy—parasthesias and glove and stocking neuropathy
      (4) Autonomic neuropathy—gastroparesis and sexual dysfunction (e.g., decreased vaginal lubrication, decreased frequency of orgasm, impotence, retrograde ejaculation)
   c. Depression—three- to fourfold increase in prevalence of depression in patients with type 1 or type 2 diabetes

• Etiology/prevalence/risk factors
   1. Type 1
      a. Caused by autoimmune destruction of the pancreatic beta cells that produce insulin
         (1) Genetic predisposition, a hypothetical triggering event, and immunologically mediated beta cell destruction
         (2) Typically begins in childhood or adolescence but can occur in adults of any age; obesity is rarely a factor when patients present with this type of diabetes
      b. Manifested by absolute insulin deficiency that results in elevation of blood glucose, breakdown of fats and proteins
      c. Predisposition to development of ketoacidosis—this may be first manifestation of type 1 diabetes or first appear in presence of infection or other stress
   2. Type 2
      a. Characterized by impaired insulin secretion, peripheral insulin resistance, and increased hepatic glucose production
      b. Typically occurs in those older than age 45 years, those who are overweight and sedentary, and those with a family history of diabetes
      c. Racial/ethnic groups at increased risk—Native Americans, Hispanics, African Americans
   3. GDM
      a. Function of hormonal/metabolic demands of pregnancy; usually regresses after parturition
      b. Fifty percent risk of developing diabetes within five years if insulin was required for control of GDM; 60% risk of developing disease within 10 to 15 years if dietary management was sufficient
   4. Prediabetes—impaired fasting glucose (IFG) and impaired glucose tolerance (IGT)
      a. Hyperglycemia not sufficient to meet diagnostic criteria for diabetes
      b. Categorized as IFG if identified by fasting blood glucose or IGT if identified by oral glucose tolerance test in the two-hour sample
      c. Both categories are risk factors for diabetes and cardiovascular disease

Endocrine Disorders

Diabetes

• Definition
   1. A heterozygous group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both
   2. Types
      a. Type 1—absolute insulin deficiency
      b. Type 2—combination of resistance to insulin action and inadequate compensatory insulin secretory response
      c. Gestational diabetes mellitus (GDM)—glucose intolerance diagnosed during pregnancy; excludes high-risk women found to have diabetes at initial prenatal visit using standard criteria
      d. Diabetes secondary to other causes
         (1) Genetic defects in beta-cell function/insulin action
         (2) Diseases of the pancreas or other endocrinopathies in which excess hormones antagonize insulin action (e.g., growth hormone, cortisol, glucagon, epinephrine)
         (3) Drug-, chemical-, or viral infection–induced
      e. Metabolic syndrome—group of metabolic components, synergistic in nature, that can lead to cardiovascular disease: abdominal obesity, insulin resistance and hyperglycemia, elevated triglycerides and low HDL, hypertension, and pro-inflammatory state

• Referral
   1. Medications managed by rheumatology specialist and/or specialist in care of women with autoimmune disorders
   2. Physical therapy, occupational therapy
   3. Surgical procedures
5. Prevalence in the general population estimated at 6–8% of individuals older than 40 years
   a. Type 1 accounts for approximately 10% of diagnosed cases
   b. Type 2 prevalence is estimated at more than 14 million cases; many undiagnosed

- Symptoms
  1. “Classic” symptoms—polyuria, polydipsia, polyphagia
  2. Weight loss
  3. Fatigue and/or weakness
  4. Persistent/recurrent vaginal candidiasis; candidal balanitis
  5. Vision changes, blurred vision
  6. Type 2 often asymptomatic in early stages

- Physical findings
  1. Early
     a. Thin, decreased weight/type 1; overweight, obese/type 2
     b. Hypertension/type 2
     c. Skin infections—frequent or slow to heal
  2. With more advanced disease
     a. Skin—ulcerations of feet and legs; loss of hair lower legs and toes
     b. Eyes—retinopathy/microaneurysms; exudates; neovascularization; cataracts; glaucoma
     c. Cardiovascular—diminished or absent peripheral pulses; orthostatic hypotension/ominous finding
     d. Neurologic—sensory loss; diminished/absent deep tendon reflexes

- Differential diagnosis
  1. Type 1 versus type 2
  2. Pancreatic disease
  3. Cushing’s syndrome
  4. Secondary effects of drug therapy—corticosteroids, thiazide diuretics

- Diagnostic tests/findings
  1. Criteria for diagnosis of diabetes type 1 and type 2 (American Diabetes Association [ADA], 2016a)
     a. Diabetes can be diagnosed in any one of four ways; must be confirmed on a subsequent day unless patient also has classic symptoms of hyperglycemia or hyperglycemic crisis
        (1) Fasting plasma glucose—126 mg/dL or greater; fasting defined as no caloric intake for at least eight hours
        (2) Oral glucose tolerance test (OGTT)—value of 200 mg/dL or greater in the two-hour sample; using glucose load of the equivalent of 75 g glucose dissolved in water
        (3) Hemoglobin (Hgb) A1c—6.5% or greater
        (4) Random plasma glucose—200 mg/dL or greater with classic symptoms of hyperglycemia or hyperglycemic crisis
     b. Criteria for diagnosis of prediabetes
        (1) IFG—fasting plasma glucose of 100–125 mg/dL
        (2) IGT—results of oral glucose tolerance test of 140–199 mg/dL in the two-hour sample
        (3) Hgb A1c—5.7–6.4%
     c. Criteria for diagnosis of GDM (American Diabetes Association, 2016a)—test at 24–28 weeks in women not previously diagnosed with overt diabetes
        (1) One-step strategy—75 g OGTT at 24–28 weeks in women not previously diagnosed with overt diabetes with any of these values exceeded: fasting 92 mg/dL, one hour 180 mg/dL, two hour 153 mg/dL
        (2) Two-step strategy
           (a) Step 1—one hour 50 g glucose load test (nonfasting); if > 140 mg/dL, proceed to Step 2
           (b) Step 2—100 g OGTT with at least two of the four plasma glucose levels (fasting, one hour, two hour, three hour) are met or exceeded: fasting 95 mg/dL, one hour 180 mg/dL, two hour 155 mg/dL, three hour 140 mg/dL

2. Criteria for screening asymptomatic adults (fasting plasma glucose, two-hour 75-g OGTT, or HgbA1c) include (American Diabetes Association, 2016a)
   a. Anyone older than 45 years at three-year intervals
   b. Consider testing younger than 45 years or more frequent screening in adults who are overweight or obese (BMI 25 or greater) with one or more additional risk factors
      (1) Physical inactivity
      (2) First-degree relative with diabetes (parent, sibling)
      (3) Member of a high-risk race/ethnic population
      (4) Delivered infant of greater than nine pounds or history of GDM
      (5) Hypertension
      (6) HDL cholesterol of 35 mg/dL or less and/or triglyceride level of 250 mg/dL or more
      (7) Cardiovascular disease
      (8) HgbA1c, 5.7%, IFG or IGT on previous testing
      (9) Polycystic ovarian syndrome
      (10) Other conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans)

3. Criteria for screening pregnant and postpartum women (American Diabetes Association, 2016a)
   a. Screen for undiagnosed type 2 diabetes at initial prenatal visit in women with risk factors using standard diagnostic criteria
   b. Screen pregnant women at 24–28 weeks if not previously diagnosed with overt diabetes
   c. Screen women with GDM for persistent diabetes at six to 12 weeks postpartum using standard diagnostic criteria
   d. Screen women with GDM every three years for diabetes or prediabetes

- Management/treatment
  1. Clinical trials have demonstrated that glycemic control is associated with decreased rates of microvascular complications; epidemiologic studies support reduction in cardiovascular disease (American Diabetes Association, 2016b)
  2. The American Diabetes Association recommends the blood glucose, blood pressure, and lipid goals shown in Table 10-8 for most adults with diabetes (2016b)
  3. Based on individual patient characteristics, glucose, blood pressure, and lipid goals may be lower
  4. Nonpharmacologic—types 1 and 2
     a. Home glucose determinations to monitor glycemic control daily
- **Table 10-8** Recommended Blood Glucose, Blood Pressure, and Lipid Goals for Most Adults with Diabetes

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hgb A1c</td>
<td>&lt; 7.0%</td>
</tr>
<tr>
<td>Preprandial capillary plasma glucose</td>
<td>80–130 mg/dL</td>
</tr>
<tr>
<td>Peak postprandial capillary plasma glucose</td>
<td>&lt; 180 mg/dL</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>&lt; 140/80 mm Hg</td>
</tr>
<tr>
<td>Lipids</td>
<td>&lt; 100 mg/dL</td>
</tr>
<tr>
<td>LDL cholesterol</td>
<td></td>
</tr>
</tbody>
</table>


- **Table 10-9** Types and Actions of Insulin

<table>
<thead>
<tr>
<th>Type of Insulin</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid acting: aspart, glulisine, lispro</td>
<td>10 to 30 minutes</td>
<td>½ hour to 3 hours</td>
<td>3 to 5 hours</td>
</tr>
<tr>
<td>Short acting: regular</td>
<td>30 to 60 minutes</td>
<td>1 to 5 hours</td>
<td>6 to 8 hours</td>
</tr>
<tr>
<td>Intermediate acting: NPH, combination NPH, and regular</td>
<td>1 to 2 hours</td>
<td>4 to 12 hours</td>
<td>14 to 24 hours</td>
</tr>
<tr>
<td>Long acting: detemir, glargine, ultralente</td>
<td>1 to 2 hours</td>
<td>Constant (no peak)</td>
<td>24 hours</td>
</tr>
</tbody>
</table>


b. Diet
   - (1) Evidence inconclusive on percentage of calories to come from carbohydrates, protein, and fat
   - (2) Individualized diabetes nutrition therapy is needed to achieve treatment goals with registered dietician
   - (3) Reduced caloric intake while maintaining healthful eating for weight loss as needed

c. Regular aerobic exercise
   - (1) Improves blood glucose control
   - (2) Reduces cardiovascular risk factors
   - (3) Contributes to weight loss

d. Smoking cessation

e. Refer type 2 diabetics at time of diagnosis and type 1 diabetics within three to five years for eye examination; annually thereafter

f. Perform comprehensive foot examination annually; examination should include use of a Semmes-Weinstein monofilament, tuning fork, and a visual examination

g. Annual influenza vaccination; pneumococcal vaccination

h. Diabetes self-management education (DSME) and diabetes self-management support (DSMS) according to national standards from ADA

5. Pharmacologic
   a. Insulin—type 1 diabetes, may be combined with oral medications for type 2 diabetes if needed; see Table 10-9 for types and actions of insulin
      - (1) Some patients may need more than three insulin injections per day and/or to use an insulin pump to maintain control
      - (2) For patients with frequent nocturnal hypoglycemia and/or hypoglycemia unawareness, consider use of sensor-augmented low glucose suspend threshold pump
   b. Oral agents—type 2 diabetes (see Table 10-10)
      - (1) May consider management with diet and exercise first; if glucose intolerance persists, begin oral agent

(2) Several classes of oral agents with different mechanisms of action subdivided into two main categories
   a. Hypoglycemic agents—for example, sulfonylureas, meglitinitides
   b. Antihyperglycemic agents—for example, biguanides, dipeptidyl peptidase-4 inhibitors, alpha-glucoside inhibitors, thiazolidinediones, incretin mimetics

(3) Choice of initial oral agent balances mechanism of action with specific characteristics of patient such as BMI, Hba1c, other lab values, risk factors for cardiovascular disease

(4) Initial treatment and subsequent treatment changes are assessed every two to three months with review of self-monitoring glucose records and Hba1c

(5) If treatment goals not met, additional pharmacologic therapy, often combination therapy, is prescribed

c. Consider aspirin therapy in women with diabetes who have a history of cardiovascular disease or who are age 50 years or older with one or more additional cardiovascular risk factors (American Diabetes Association, 2016b)

6. Patient education—DSME and support
   a. Family involvement in care, medication instruction
   b. Safety concerns, especially compensation for neuropathies
   c. Ensure compliance with drug regimen
      - (1) Appropriate injection technique for insulin
      - (2) Importance of regular dosing, oral or parenteral
   d. Blood glucose monitoring
      - (1) Routine schedule and glycemic target values
      - (2) Aseptic technique for blood sampling
      - (3) Medication dosage calculation based on blood glucose
   e. Risk factor management and screening
      - (1) Smoking cessation if appropriate
      - (2) Annual comprehensive eye examination with ophthalmologist
      - (3) Foot care
      - (4) Dental hygiene and annual examination
      - (5) Nutritional counseling with registered dietitian
### Table 10-10 Oral Medications Used to Treat Type 2 Diabetes Mellitus (Representative List)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Action</th>
<th>Side Effects</th>
<th>Interactions</th>
<th>Contraindications/Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biguanides (metformin):</td>
<td>Decreases hepatic glucose production and intestinal absorption of glucose; increases peripheral glucose uptake and utilization; may be used as monotherapy or as combination therapy</td>
<td>Anorexia, nausea, diarrhea, abdominal bloating, lactic acidosis is serious, rare</td>
<td>Effects potentiated by cimetidine, ranitidine, nifedipine, digoxin, trimethoprim, alcohol</td>
<td>Renal disease or dysfunction, metabolic acidosis, high risk for lactic acidosis. No evidence of harm to fetus</td>
</tr>
<tr>
<td>Preferred initial agent for Type 2 diabetes in nonpregnant individual if tolerated and not contraindicated</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfonylureas:</td>
<td>Stimulates insulin secretion from pancreatic beta cells; may be used as monotherapy or as combination therapy</td>
<td>Hypoglycemia, weight gain, photosensitivity, GI upset, cholestatic jaundice</td>
<td>Several drugs may potentiate or reduce hypoglycemic effect</td>
<td>Ketoacidosis, impaired renal, hepatic function. First-generation sulfonylureas associated with teratogenic risk in animal studies; no controlled human data in pregnancy</td>
</tr>
<tr>
<td>First generation—chlorpropamide, tolbutamide; second generation—glipizide, glyburide, glimepiride</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dipeptidyl peptidase-4 inhibitors: sitagliptin, linagliptin</td>
<td>Inhibits degradation of incretin GLP-1 with subsequent increase of insulin release from pancreas; action in response to elevated glucose; may be used as monotherapy or as combination therapy</td>
<td>Nasopharyngitis, headache, GI discomforts, arthralgia</td>
<td>Several drugs may reduce effects; beta blockers may prolong hypoglycemia</td>
<td>Contraindicated for type 1 diabetes; caution with renal function impairment. No evidence of fetal harm in animal studies; no controlled human data in pregnancy</td>
</tr>
<tr>
<td>Glucagon-like peptide 1 (GLP-1 receptor agonists/incretin mimetic: exenatide, liraglutide (subcutaneous injection rather than oral medication)</td>
<td>Binds to GLP-1 receptor; stimulates production and secretion of insulin; may be used as monotherapy or as combination therapy</td>
<td>GI upset, hypoglycemia, jittery feeling, dizziness, headache</td>
<td>Increased risk for hypoglycemia in combination with meglitnides or sulfonylurias</td>
<td>Contraindicated for type 1 diabetes; caution with renal function impairment, GI disorders. No evidence of fetal harm in animal studies; no controlled human data in pregnancy</td>
</tr>
<tr>
<td>Alpha-glucosidase inhibitors: aacarbose, miglitol</td>
<td>Delays absorption of carbohydrates; inhibits metabolism of sucrose to glucose and fructose; not used as monotherapy</td>
<td>Flatulence, diarrhea, abdominal discomfort (symptoms decrease over time); increases in AST, ALT</td>
<td>Digestive enzymes, intestinal absorbents decrease effect; may decrease effects of digoxin, propranolol</td>
<td>Inflammatory bowel disease, or any intestinal disease causing disordered digestion or absorption. No evidence of fetal harm in animal studies; no controlled human data in pregnancy</td>
</tr>
<tr>
<td>Meglitinides: repaglinide</td>
<td>Stimulates insulin release from pancreas; may be used as monotherapy or as combination therapy</td>
<td>Hypoglycemia, headache, dizziness</td>
<td>Several drugs may potentiate or reduce hypoglycemic effect</td>
<td>Caution in hepatic impairment. No evidence of fetal harm in animal studies; no controlled human data in pregnancy</td>
</tr>
<tr>
<td>Thiazolidinediones: rosiglitazone, pioglitazone</td>
<td>Improves insulin sensitivity, glucose uptake in muscle and adipose tissue; inhibits gluconeogenesis; may be used as monotherapy or as combination therapy</td>
<td>Edema, headache, myalgia, initial increase in LDL and HDL</td>
<td>Several drugs may potentiate or reduce hypoglycemic effect</td>
<td>Hepatotoxicity—monitor Liver function tests (LFTs) at start of therapy, q 2 mo, first year; congestive heart failure. No evidence of teratogenicity in animal studies; no controlled human data in pregnancy</td>
</tr>
</tbody>
</table>

f. Preconception counseling emphasizing optimal glucose control, folic acid supplementation, early prenatal care, precautions in pregnancy concerning oral diabetes medication

g. Contraception counseling
(1) Most contraceptive methods can be used without complicat-
(2) Combination hormonal contraceptives contraindicated (Cat-
(3) DMPA not recommended unless other acceptable meth-
h. Hypoglycemia causes, symptoms, management
(1) Cause—side effect of insulin or oral medications for dia-
(2) Symptoms
(a) Caused by alteration in brain and CNS function be-
(b) Mild—hunger, weakness, shakiness, sweating, diffi-
(c) Moderate—increased irritability, inability to complete
d. Thyroiditis—group of inflammatory diseases
(1) Inflammation causes disruption of the follicles resulting in
(2) Usually self-limited
(3) Phases—thyrotoxicosis, transient euthyroid, hypothyroid,
(4) Classification of thyroiditis
(a) Subacute lymphocytic—autoimmune process
(i) Postpartum thyroiditis
(ii) Painless/sporadic thyroiditis
(b) Subacute granulomatous/de Quervain's thyroiditis—

i. Hyperglycemia causes, symptoms, management
(1) Cause—insulin deficiency precipitated by acute illness, in-
(2) Symptoms
(a) Early symptoms may include increased thirst, frequent
(b) Progressive symptoms with diabetic ketoacidosis may

j. Hypothyroidism causes, symptoms, management
(1) Cause—autoimmune condition; excess synthesis and secretion of

k. Hyperthyroidism
(1) Etiology/incidence
(1) Comprises 90% of cases
(2) Thyroiditis
(a) Painful/sporadic
(b) Subacute granulomatous/de Quervain's
(c) Toxic multinodular goiter—accounts for most cases in
(d) Thyroid—group of inflammatory diseases
(1) Inflammation causes disruption of the follicles resulting in
(2) Usually self-limited
(3) Phases—thyrotoxicosis, transient euthyroid, hypothyroid,
(4) Classification of thyroiditis
(a) Subacute lymphocytic—autoimmune process
(i) Postpartum thyroiditis
(ii) Painless/sporadic thyroiditis
(b) Subacute granulomatous/de Quervain's thyroiditis—

l. Hyperglycemia symptoms—nonspecific, affecting all body systems; reflect increased

m. References
1. All newly diagnosed cases for complete medical evaluation
2. Evaluation of suspected or developing complications

Hyperthyroidism
• Definition—a hypermetabolic syndrome affecting all body systems

• Physical findings
1. Thyroid gland—enlarged/diffuse or asymmetric nodularity
2. Neuromuscular system—hyperreflexia, tremor, muscle wasting
3. Dermatologic system—skin moist, smooth
4. Cardiovascular system—tachycardia, systolic flow murmur, atrial
5. Eyes—lid retraction
6. Gastrointestinal system—increased bowel sounds
7. Graves's disease
a. Symmetrical and moderate thyroid enlargement/bruit
b. Exophthalmos/proptosis and pretibial myxedema (nonpitting

• Symptoms—nonspecific, affecting all body systems; reflect increased

• Etiology/incidence
1. Etiology
a. Graves's disease
(1) Comprises 90% of cases
(2) Autoimmune condition; excess synthesis and secretion of
thyroid hormone caused by antibodies that stimulate TSH
receptors
b. Toxic multinodular goiter—accounts for most cases in
middle-aged and elderly adults
c. Toxic adenoma/solitary autonomous nodule—single
hyper-functioning nodule within thyroid tissue
d. Thyroiditis—group of inflammatory diseases
(1) Inflammation causes disruption of the follicles resulting in
release of preformed thyroid hormone
(2) Usually self-limited
(3) Phases—thyrotoxicosis, transient euthyroid, hypothyroid,
recovery
(4) Classification of thyroiditis
(a) Subacute lymphocytic—autoimmune process
(i) Postpartum thyroiditis
(ii) Painless/sporadic thyroiditis
(b) Subacute granulomatous/de Quervain's thyroiditis—
likely viral in origin and generally preceded by URI

2. Incidence
a. Annual incidence 0.05–1% in general adult population
b. Hyperthyroidism is five to 10 times more common in females
than in males
c. Postpartum thyroiditis occurs in 8–10% of women within one
year of delivery; increased incidence with diabetes or high
microsomal antibody titers before pregnancy

3. Proximal muscle weakness, tremor

4. Fatigue, exertional shortness of breath
5. Palpitations, chest pain
6. Diarrhea
7. Menstrual irregularities, amenorrhea, infertility
8. Eye irritation, vision changes, double vision (Graves's)
9. Proximal muscle weakness, tremor

5. Eyes—lid retraction
6. Gastrointestinal system—increased bowel sounds
7. Graves's disease
a. Symmetrical and moderate thyroid enlargement/bruit
b. Exophthalmos/proptosis and pretibial myxedema (nonpitting
thickening of skin)
May increase risk for hepatocellular damage—monitor LFTs; most risk is with PTU

May potentiate oral anticoagulants

Pregnant women with overt hyperthyroidism should be treated with a thionamide to reduce risk of preterm delivery, low birthweight, fetal loss

PTU recommended in first trimester—crosses placenta less readily than methimazole; no known teratogenic effects; does present higher risk for hepatotoxicity

Switch to methimazole in second trimester—increased risk for major fetal anomalies when taken in first trimester; less risk for hepatotoxicity than PTU (Stagnaro-Green et al., 2011)

c. RAI therapy
(1) Drug action
(a) Damages functioning thyroid tissue
(b) Reduces symptoms in 6–12 weeks

(2) Side effects
(a) Long-term hypothyroidism; 70% of patients at 10 years
(b) May exacerbate ophthalmopathy in the short term

(3) Contraindications—pregnancy or lactation; use contraception for 6–12 months following RAI administration
d. Beta blockers—propranolol, atenolol (see Table 10-1)
(1) Decrease signs and symptoms by blocking sympathetic nervous system
(2) Indicated for symptomatic relief until more specific therapy initiated
e. Management of thyroiditis—often no treatment required
(1) Beta blockers for symptomatic treatment of thyrotoxicosis
(2) Subacute granulomatous thyroiditis
(a) NSAIDs for pain/inflammation
(b) Prednisone for extreme cases (see Table 10-3)

4. Patient education
a. Medication regimens, side effects
b. Signs/symptoms of thyroid storm—an exaggeration of signs and symptoms of hyperthyroidism; acute, life-threatening exacerbation of hyperthyroidism that is a medical emergency
c. Avoid pregnancy for 6–12 months after RAI administration to avoid fetal thyroid ablation and possible gonadal chromosomal damage secondary to radiation effect on ovaries

• Referral
(1) Evaluation for treatment options
(2) Ophthalmologist referral for ophthalmopathy
(3) Surgical referral for patients with obstructive symptoms
Hypothyroidism

- Definition—a metabolic syndrome affecting all organ systems characterized by deficient levels of circulating thyroid hormone
- Etiology/incidence/risk factors
  1. Etiology
     a. Primary thyroid failure
        (1) Hashimoto’s thyroiditis—chronic autoimmune thyroiditis
        (2) Previous RAI treatment, surgery
     b. Secondary—pituitary or hypothalamic disease
     c. Transient
        (1) Subacute granulomatous thyroiditis/de Quervain’s
        (2) Subacute lymphocytic thyroiditis/postpartum and sporadic painless
  2. Prevalence estimated 1–3% of general population
     a. Increasing prevalence with age and in women
     b. Women older than 50 years have estimated 5% prevalence
  3. Risk factors
     a. Age older than 50 years
     b. Female-to-male ratio is 8–10:1
     c. History of autoimmune disease
     d. Family or personal history of thyroid disease
- Symptoms—often subclinical; reflect slowed physiologic functioning of all organ systems
  1. Weakness, lethargy
  2. Skin changes—dry or coarse skin, skin pallor; coarse hair
  3. Slow speech, forgetfulness, depression
  4. Cold sensation, decreased sweating
  5. Eyelid, facial edema
  6. Constipation
  7. Irregular menses—menorrhagia, amenorrhea; infertility
  8. Weight gain
- Physical findings—depend on severity, duration of deficiency, and rapidity of development
  1. Thyroid gland may be atrophic, normal, or goitrous
  2. Neuromuscular system—diminished relaxation phase of reflexes, carpal tunnel syndrome, hearing loss
  3. Dermatologic system—skin cool, dry; hair dry, brittle; generalized hair loss, especially outer third of eyebrows
  4. Cardiovascular system—bradycardia; edema, especially periorbital; anemia
  5. Gastrointestinal system—diminished bowel sounds
  6. Endocrine system—galactorrhea
  7. Mentation may be slowed and may appear lethargic and expressionless
- Differential diagnosis
  1. Primary versus secondary
  2. Clinical depression
  3. Antithyroid drugs—lithium
- Diagnostic tests/findings—see Table 10-11
  1. TSH—elevated in primary hypothyroidism
  2. Free T<sub>4</sub>—decreased
  3. Decreased TSH and FT<sub>4</sub> in secondary hypothyroidism
  4. Antithyroid peroxidase (anti-TPO), Hashimoto’s thyroiditis
  5. Women with positive TPO antibodies (even when euthyroid) have increased risk for recurrent miscarriage with or without infertility
  6. Other lab findings may include an elevated cholesterol level and mild normocytic, normochromic anemia
- Management/treatment
  1. Most patients with primary hypothyroidism need lifelong thyroid hormone therapy
  2. Levothyroxine
     a. Drug action—synthetic T<sub>4</sub>
        (1) T<sub>4</sub> converted to T<sub>3</sub>; administration of T<sub>4</sub> produces both hormones
        (2) Half-life six days; slow rate of achieving steady state
        (3) Adjust dose every six weeks until TSH normalizes
     b. Contraindications/precautions
        (1) Potentiates sympathomimetics
        (2) Contraindicated with thyrotoxicosis, acute MI, uncorrected adrenal insufficiency
  3. Treatment of clinical hypothyroidism during pregnancy
     a. Untreated hypothyroidism is associated with low birthweight, preterm delivery, impaired neuropsychological development of fetus, postpartum hemorrhage
     b. Levothyroxine is safe to use during pregnancy as well as during lactation
     c. Measure TSH at four- to six-week intervals; adjust levothyroxine dose as needed to maintain trimester-specific TSH levels
  4. Treatment of subclinical hypothyroidism elevated TSH in presence of normal thyroid hormone levels
     a. Majority progress to clinical hypothyroidism
     b. Treat if TSH greater than 10 μIU/mL
     c. Treat if TSH between 5 and 10 μIU/mL and elevated anti-TPO titers, symptoms of hypothyroidism, goiter, or depression
     d. Studies on adverse pregnancy outcomes associated with subclinical hypothyroidism are inconsistent, as are studies showing any improvement in outcomes when treated
  5. Patient education
     a. Medication use and doses; need for long-term therapy
     b. Danger of increasing medication too rapidly or taking more than prescribed
     c. Preconception counseling—untreated hypothyroidism during pregnancy may adversely affect maternal and fetal outcomes; early prenatal care and close monitoring of TSH levels for adjustments in medication are important
- Referral—all secondary cases for evaluation

Musculoskeletal Disorders

Low Back Pain (LBP)

- Definition—acute (< than three months), chronic, or recurrent pain occurring in the lumbosacral spine region; pain may be localized or radiate to the extremities
- **Etiology/incidence/risk factors**
  1. **Etiology**
     a. Lumbosacral strain results from stretching, tearing of muscles, tendons, ligaments, and fascia due to trauma or repetitive mechanical stress
     b. Herniated intervertebral disc causes nerve root compression, resulting in pain below the knee and other neurologic signs and symptoms
     c. Other underlying medical conditions
  2. **Incidence**
     a. One of the top 10 reasons for visit to primary care provider
     b. Estimated 60–85% of individuals experience at least one episode
     c. Women and men equally affected
     d. Chronic LBP comprises about 2% of all cases
  3. **Risk factors—acute LBP**
     a. Repetitive motion
     b. Poor body mechanics
     c. Poor strength of abdominal and back muscles

- **Symptoms**
  1. **Lumbosacral strain**
     a. Pain located in the lower back, buttocks
     b. Pain characterized as spasm, aching
     c. Pain aggravated by standing/flexion; relieved with rest/reclining
  2. **Herniated intervertebral disc**
     a. Pain felt in buttock or radiating into lower extremity (radicular) rather than localized to lower back area
     b. Pain characterized as sharp, burning, shooting
     c. Pain increased with bending and maneuvers that increase intra-abdominal pressure, for example, straining for bowel movement
     d. Also associated with numbness and tingling over distribution of involved nerve root
     e. Most common disc ruptures involve the L5 or S1 nerve roots
       1. L5 root/L4–5 disc—pain/numbness lateral calf
       2. S1 root/L5–S1 disc—pain buttocks, lateral leg, and malleolus; numbness lateral foot and posterior calf

- **Physical findings**
  1. **Lumbosacral strain**
     a. Increased pain with back flexion
     b. Possible tenderness with palpation over paraspinal muscles
     c. Negative straight leg raise (SLR)
     d. Normal neurologic exam
  2. **Herniated intervertebral disc**
     a. Increased pain with back flexion
     b. Positive SLR—radicular pain when leg is passively raised 30–60°
     c. L5 root—weakness of dorsiflexion of great toe; decreased sensation anterior/medial dorsal foot
     d. S1 root—weakness of plantar flexion/tip toe walking; diminished/absent Achilles reflex; decreased sensation lateral foot

- **Diagnostic tests/findings**
  1. Indicated in the presence of “red flags”—fever, chills, weight loss, recent onset bladder/bowel dysfunction, lower extremity sensory or neurologic deficit
  2. **Radiograph of lumbosacral spine**
     a. Generally not necessary in acute phase—three to six weeks duration
     b. Suspicion of fracture
     c. Suspicion of malignancy—patient older than 50 years; persistent bone pain unrelieved by bed rest; history of malignancy
  3. **MRI or CT**
     a. Severe persistent symptoms despite conservative treatment
     b. Suspected disc herniation

- **Management/treatment**
  1. **Nonpharmacologic**
     a. Encourage continuation of daily activities rather than bed rest
     b. Local application of heat, warm baths
     c. Prescribe physical therapy program to improve strength and conditioning
     d. Low-stress aerobic exercise—walking, biking, swimming
  2. **Pharmacologic**
     a. NSAIDs
     b. Muscle relaxant—cyclobenzaprine
       1. Drug action—reduces tonic somatic motor activity in the brain stem
       2. **Contraindications/precautions**
          a. May cause somnolence
          b. Potentiates alcohol and other CNS depressants
          c. Increased risk for hypertensive crisis with MAO inhibitors
          d. Limit to one to two weeks at most
          e. Avoid use in elderly adults
          f. Use not recommended during pregnancy

- **Differential diagnosis**
  1. **Cauda equina syndrome**
     a. Surgical emergency because of impingement on the cauda equina
     b. Characterized by saddle anesthesia, bladder or bowel incontinence, muscle weakness
     c. Immediate MRI and referral to neurosurgery
  2. **Fracture**
     a. Major trauma such as motor vehicle accident or fall from high place
     b. Risks: ≥ 50 years of age, osteoporosis
  3. **Osteoporosis/compression fracture**—may be precipitated by minor trauma or lifting
  4. **Neoplasm**
     a. Constitutional symptoms, no relief with bed rest, chronic pain, urinary retention
     b. Risks: ≥ 50 years of age, history of cancer
  5. **Infection**—chills, fever, IV drug user, recent bacterial infection, immunosuppression, comorbidities
c. Opioid pain relievers—only use for acute pain and when other treatments do not relieve pain; limit use to no more than 72 hours

3. Patient education
   a. Avoid bed rest
   b. Weight loss if indicated to reduce lordosis
   c. Good body mechanics; proper lifting
   d. Appropriate exercises
   e. Signs of deterioration
      (1) Loss of bladder control
      (2) Numbness or weakness in groin or rectal area
      (3) Pain extending down leg past knee
   f. Reassurance
      (1) Excellent prognosis for complete resolution of acute LBP episodes
      (2) Recurrence likely at variable intervals

• Referral
  1. Urgently refer patients to neurosurgery with symptoms suggestive of cauda equina or cord compression
  2. Symptoms suggestive of spinal infection or malignancy
  3. Neurologic consultation if back pain remains severe after four to six weeks of conservative treatment or findings of neurologic deficits

Osteoarthritis

• Definition
  1. Noninflammatory joint disease characterized by degeneration of articular cartilage with new bone formation at articular surface
  2. Most commonly involved joints are distal and proximal interphalangeals of hands, hips, knees, and cervical and lumbar spine
  3. Primary—no obvious cause
  4. Secondary—occurring in damaged or abnormal joints

• Etiology/incidence/risk factors
  1. Etiology
     a. Progressive degeneration and loss of articular cartilage and subchondral bone
     b. Bone ends thicken and osteophytes or spurs form where the ligaments and capsule attach to the bone
     c. Variable synovial inflammation results
  2. Incidence
     a. Radiographic evidence in 80% of adults by age 60
     b. Clinical osteoarthritis affects approximately 25% of adults
  3. Risk factors
     a. Increasing age
     b. Female gender
     c. Obesity
     d. Major joint trauma
     e. Repetitive joint stress
     f. Congenital and developmental joint defects
     g. Metabolic and endocrine disorders

• Symptoms
  1. Gradual onset of joint pain, tenderness, and limited movement
  2. Pain aggravated by joint use and subsides with rest
  3. Morning joint stiffness or stiffness following a period of inactivity, lasting generally less than 30 minutes
  4. Symptoms often asymmetrical

• Physical findings
  1. Decreased range of motion
  2. Effusions of involved joint(s) with minimal local warmth and no erythema
  3. Enlargement of distal interphalangeal (DIP) joints: Heberden’s nodes; enlargement of PIP joints: Bouchard’s nodes
  4. Crepitus with joint motion

• Differential diagnosis
  1. Rheumatoid arthritis
  2. Infectious arthritis
  3. Tendonitis/bursitis syndromes
  4. Crystal-induced arthritis—gout, pseudogout
  5. Fracture

• Diagnostic tests/findings
  1. Radiography
     a. Does not demonstrate deterioration of cartilage
     b. Four cardinal radiologic features
        (1) Narrowed joint space
        (2) Sclerosis of subchondral bone
        (3) Bony cysts
        (4) Osteophytes
  2. Diagnostic joint fluid aspiration
     a. Indicated if joint effusion
     b. Synovial fluid analysis—WBC count with differential; culture; evaluation for crystals
     c. Findings in osteoarthritis—WBC count less than 2,000 cells/mL; negative culture; negative for crystals
  3. Laboratory—normal in primary osteoarthritis
     a. Rheumatoid factor (RF)/ANAs—if arthritis is inflammatory and symmetrical in distribution to exclude rheumatoid arthritis or SLE
     b. Erythrocyte sedimentation rate—elevated in many autoimmune, inflammatory, infectious diseases
     c. CBC—if an inflammatory or infectious arthritis suspected

• Management/treatment
  1. Nonpharmacologic
     a. Appliances (e.g., canes, crutches, orthotics)
     b. Exercise
        (1) Aerobic
        (2) Resistance training
        (3) Muscle strengthening
     c. Yoga
     d. Supervised heat and cold therapy
     e. Weight loss if indicated
     f. Transcutaneous electrical nerve stimulation (TENS)
     g. Massage
     h. Acupuncture
     i. Rest during exacerbations

   3. Morning joint stiffness or stiffness following a period of inactivity, lasting generally less than 30 minutes
   4. Symptoms often asymmetrical
2. Pharmacologic
   a. Oral analgesics
      (1) Acetaminophen
      (2) Tramadol
      (3) NSAIDs
   b. Topical analgesics
      (1) Capsaicin cream
      (2) Diclofenac
   c. Intra-articular injection
      (1) Glucocorticoids—beneficial in patients with inflammation, effusion, or substantial pain
      (2) Hyaluronic acid—synovial fluid analog
3. Patient education
   a. Symptomatic relief techniques (e.g., cold, heat, immobilization, rest)
   b. Medication regimens and precautions

- Referral
  1. Physical therapy, exercise
  2. Need for joint injection
  3. Surgery consultation—joint replacement

**Osteoporosis**

- Definition—disease characterized by low bone mass and structural deterioration of bone tissue, leading to bone fragility and an increased susceptibility to fractures of the hip, spine, and wrist (National Osteoporosis Foundation, 2014)
- Etiology/incidence
  1. Combination of factors including nutrition, genetics, level of physical activity, age, and estrogen status
  2. Close to 10 million Americans have osteoporosis (Wright et al., 2014)
  3. Approximately one out of every two women in the United States will experience a fracture related to osteoporosis (Wright et al., 2014)
  4. Most common fracture sites are vertebrae, femur, and dorsal forearm. In older population, these fractures may lead to chronic pain, disability, and even death
  5. Conditions, diseases, and medications that cause or contribute to osteoporosis and fractures include but are not limited to (National Osteoporosis Foundation, 2014)
     a. Advanced age
     b. Female gender
     c. Lifestyle
        (1) Low calcium intake
        (2) Alcohol (intake of three or more drinks/day)
        (3) Current cigarette smoking (active or passive)
        (4) Vitamin D insufficiency
        (5) High salt intake
        (6) Inadequate physical activity, immobilization
        (7) Falling, prior history of osteoporotic fracture
        (8) Thinness, low BMI
     d. Genetic disorders
        (1) Cystic fibrosis
        (2) Ehlers–Danlos
     e. Hypogonadal states
        (1) Androgen insensitivity
        (2) Anorexia nervosa and bulimia
        (3) Athletic amenorrhea
        (4) Hyperprolactenemia
        (5) Panhypopituitarism
        (6) Premature ovarian failure
        (7) Turner’s and Klinefelter’s syndromes
     f. Endocrine disorders
        (1) Adrenal insufficiency
        (2) Cushing’s syndrome
        (3) Diabetes mellitus
     g. Medications
        (1) Glucocorticoids—long-term use
        (2) Aromatase inhibitors
        (3) Certain anticonvulsants
        (4) Excessive thyroxine doses
        (5) Cytotoxic agents
        (6) Gonadotropin-releasing agonists or analogs

- Symptoms
  1. Often a silent disease
  2. Backache
  3. Spontaneous fracture or collapse of vertebrae
- Physical findings
  1. Loss of height
  2. Kyphosis
  3. Fractures—spine, hip, wrist
- Differential diagnosis
  1. Malignancy—bone neoplasms, metastatic carcinoma, multiple myeloma
  2. Osteomalacia
  3. Paget’s disease
  4. Secondary causes of osteoporosis include
     a. Hyperparathyroidism
     b. Hyperthyroidism
     c. Cushing’s syndrome
- Diagnostic tests/findings
  1. Bone mineral density (BMD) tests
     a. World Health Organization definitions based on bone mass measurement in women include
        (1) Normal—BMD within 1 standard deviation (SD) of a young normal adult; T-score above −1
        (2) Osteopenia (low bone mass)—BMD between 1 and 2.5 SD below that of a young normal adult; T-score between −1 and −2.5
        (3) Osteoporosis—BMD 2.5 SD or more below that of a young normal adult; T-score at or below −2.5
b. Dual-energy X-ray absorptiometry (DXA)—most widely used; quick; radiation exposure one-tenth of standard chest radiograph; body sites measured: hip, spine, wrist; BMD testing at one or more of these body sites with DXA required for densitometric diagnosis of osteoporosis

c. Other bone densitometry technologies and measurement at peripheral body sites (e.g., finger, heel) may be used to predict fracture risk but are not diagnostic

2. Standard radiography—20–30% bone loss must occur for osteoporosis detection; used to detect osteoporotic fractures

3. Laboratory tests if indicated to rule out secondary causes of osteoporosis—parathyroid hormone (PTH) level, TSH, dexamethasone suppression test, and urine cortisol level for Cushing’s syndrome

4. Biochemical markers for bone turnover (urine and serum) can aid in risk assessment and as an additional monitoring tool during treatment

5. Vertebral fracture assessment (VFA)—vertebral imaging available on most modern DXA machines, can perform VFA at time of BMD assessment; vertebral fracture is consistent with diagnosis of osteoporosis independent of BMD results; consider VFA for women who are

   a. Age 70 or older if BMD T-score is at or below –1.0
   b. Age 65 to 69 if BMD T-score is at or below –1.5
   c. Postmenopause with low trauma fracture during adulthood, historical height loss of 4 cm or more, prospective height loss of 2 cm or more, recent or ongoing long-term glucocorticoid treatment

6. Fracture risk algorithm (FRAX)—developed to calculate 10-year probability of hip fracture and 10-year probability of a major osteoporotic fracture, taking into account femoral neck BMD and clinical risk factors; used to make decisions concerning preventive medications for postmenopausal women with osteopenia

**Management/treatment**

1. Nonpharmacologic—prevention and treatment

   a. Adequate intake of calcium and vitamin D
   b. Regular weight-bearing exercise
      
      (1) Thirty minutes three to four times each week
      (2) Walking, stair climbing, dancing, tai-chi, jogging
   c. Regular muscle-strengthening exercise—lifting weights, swimming
   d. Avoidance of tobacco use and alcohol abuse
   e. Fall prevention strategies—correct impaired vision, assess medications for potential to cause orthostatic hypotension, supportive low-heeled shoes, assistive devices if needed (cane, walker), home safety measures

2. Pharmacologic

   a. Consider pharmacologic treatment for postmenopausal women presenting with any of the following (National Osteoporosis Foundation, 2014)
      
      (1) Hip or vertebral fracture
      (2) T-score of –2.5 or less at the femoral neck or spine after appropriate evaluation to exclude secondary causes
      (3) T-score between –1.0 and –2.5 at femoral neck or spine and 10-year probability of hip fracture of 3% or greater, or a 10-year probability of major osteoporotic-related fracture of 20% or greater based on U.S.-adapted WHO algorithm

b. Estrogen/hormone therapy (HT)—may be considered short term (five years) for prevention if needs treatment for vasomotor symptoms and/or vulvovaginal atrophy; not approved for treatment of existing osteoporosis

c. Bisphosphonates—alendronate/risedronate: indicated for prevention and treatment; ibandronate: oral form approved for prevention and treatment, intravenous form approved for treatment; zoledronic acid: intravenous form approved for treatment

   (1) Drug action—osteoclast-mediated bone resorption inhibitor; bone formation exceeds bone resorption, leading to progressive gains in bone mass

   (2) Contraindications/precautions
      
      (a) Rare occurrence of osteonecrosis of jaw; atypical femoral fracture
      (b) Antacids and calcium interfere with absorption
      (c) Do not use if patients has esophageal stricture or inability to stand/sit upright for at least 30 minutes after taking medication
      (d) Caution for use if patient has hypocalcemia or renal disease—measure serum calcium and creatinine prior to starting medication; check serum creatinine before each ibandronate injection
      (e) Animal reproduction studies have shown an adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus

   (3) Client instructions
      
      (a) Take with 8 oz of water in the morning at least 30 minutes before any beverage, food, or medication
      (b) Do not lie down for at least 30 minutes and until the first food of the day
      (c) May take acetaminophen prior to zoledronic acid injection to reduce risk of postinjection arthralgia, headache, myalgia, fever

   d. Estrogen agonist/antagonist (formerly known as selective estrogen receptor modulators [SERMs])—raloxifene: indicated for prevention and treatment

      (1) Drug action—estrogen-like effects on bones and lipid metabolism; lacks estrogen-like effect on uterus and breasts

      (2) Contraindications/precautions
         
         (a) May increase risk for venous thromboembolic events (rare)
         (b) May cause hot flashes; leg cramps
         (c) Contraindicated in pregnancy; active or history of venous thromboembolic event; concurrent use of estrogen

   e. Denosumab—indicated for treatment of postmenopausal women with osteoporosis at high risk for fracture, if they have failed or are intolerant to other therapy, if they are receiving adjuvant aromatase inhibitor therapy for breast cancer; subcutaneous administration by healthcare professional every six months

      (1) Drug action—receptor activator of nuclear factor-B ligand (RANKL) inhibitor, inhibits osteoclasts

      (2) Contraindications/precautions
         
         (a) Rare occurrence of osteonecrosis of jaw; atypical femoral fracture
Fibromyalgia

• Definition

1. A syndrome characterized by chronic fatigue, and generalized, widespread musculoskeletal pain and stiffness associated with the finding of characteristic tender points of pain on physical examination

2. Criteria for the classification of fibromyalgia—American College of Rheumatology (Wolfe et al., 2010)

- Widespread pain index (WPI) 7 or greater and symptom severity (SS) scale score of 5 or greater or WPI 3-6 and SS scale score 9 or greater
- Symptoms present at similar level for at least three months

• Etiology/incidence

1. Etiology—unknown but classified as a rheumatic disease; several causal mechanisms postulated

- Physical or mental stress
- Sleep disturbances
- Decreased serotonin levels
- Metabolic factors
- Viral infection—EBV, CMV, herpes virus, enteroviruses

2. Incidence—unknown in general population because of misdiagnosis, self-treatment

- More common in women, with a 9:1 female to male ratio
- Most common in 30- to 50-year-olds

• Symptoms

1. Multiple, specific areas of muscle tenderness (trigger points)
2. Fatigue, sleep disturbances
3. Muscle weakness and generalized aching
4. Pain typically worsens with cold
5. Paresthesias
6. Headaches
7. Anxiety, stress
8. Depression

• Physical findings

1. Pain on digital palpation of characteristic tender points
2. Normal muscle strength, range of motion

• Differential diagnosis

1. Chronic fatigue syndrome
2. Rheumatoid arthritis
3. SLE
4. Somatization and depression

• Diagnostic tests/findings

1. Unnecessary unless a coexisting condition is suspected
2. Erythrocyte sedimentation rate normal; excludes inflammatory conditions

• Management/treatment

1. Nonpharmacologic

- Low-impact exercise (e.g., walking, swimming, tai-chi, yoga)
- Supervised heat and cold therapy
- Massage, relaxation therapy
- Biofeedback
- Hypnotherapy
- Strength training
- Acupuncture

2. Drug action—directly inhibits bone resorption of calcium; administered as a nasal spray or injection

3. Contraindications/precautions

- Hypersensitivity to salmon calcitonin
- Animal reproduction studies have shown an adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus

4. Drug action—anabolic bone-building agent, PTH; administered as a subcutaneous injection

5. Contraindications/precautions

- Avoid if increased risk for osteosarcoma; prior radiation of skeleton; bone metastases
- Contraindicated with hypercalcemia
- Animal reproduction studies have shown an adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus

6. Monitoring pharmacologic therapy effectiveness

- Baseline BMD before onset of therapy
- Repeat test every two years; more frequently if warranted by certain clinical situations
- Urine/serum biochemical markers of bone formation or resorption may be used as adjunct to monitor response to therapy—variable results and precision error limit usefulness; changes must be large to be clinically meaningful

7. Patient education

- Adequate calcium and vitamin D intake
- Weight-bearing and muscle-strengthening exercises
- Avoidance of tobacco and excessive alcohol
- Fall prevention strategies
- Medication use
2. Pharmacologic
   a. FDA-approved drugs to treat fibromyalgia
      (1) Gamma-aminobutyric (GABA) analog—pregabalin
         (a) Drug action—affects descending noradrenergic and serotonergic pain transmission pathways from the brain stem to the spinal cord
         (b) Contraindications/precautions
            i. May potentiate CNS depressants
            ii. Animal reproduction studies have shown an adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus
      (2) Selective serotonin-norepinephrine reuptake inhibitors (SNRIs)—duloxetine hydrochloride, milnacipran HCL
         (a) Drug action—mechanism by which these drugs reduce pain for people with fibromyalgia is unknown; data suggest that these drugs possibly affect the release of neurotransmitters
         (b) Contraindications/precautions
            i. May cause somnolence, dry mouth, dizziness
            ii. Animal reproduction studies have shown an adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus
   b. Tramadol—not recommended as first-line treatment
      (1) Drug action—centrally acting analgesic; creates a weak bond to opioid receptors and inhibits reuptake of both norepinephrine and serotonin
      (2) Contraindications/precautions
         (a) Seizure risk if used with other agents that lower threshold
         (b) Abuse potential
         (c) Potentiated with alcohol and other central nervous system depressants
         (d) Animal reproduction studies have shown an adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus
   c. Over-the-counter analgesics
      (1) Acetaminophen
      (2) NSAIDs
3. Patient education
   a. Reassurance regarding benign course of condition
   b. Supportive care for chronic pain
   • Referral—physical therapy, rheumatologist

**Strains/Sprains**

- Definition—musculoskeletal injury of varying degrees
  1. Strain refers to injury to muscle or tendon
  2. Sprain refers to stretching or tearing of ligaments
- Etiology/incidence/risk factors
  1. Etiology
     a. Overuse of the muscle–tendon unit by stretching, tearing, hyperextension, forceful contraction
     b. Acute injury
     c. Chronic overuse as seen in sports injury, repetitive motion
- Incidence—unknown because of frequent self-treatment, but common presenting complaint in primary care practice
- Risk factors
  a. Increased physical activity
  b. New physical exercise program
  c. Overweight
- Symptoms
  1. Pain at site of injury
  2. Strain
     a. Temporary weakness
     b. Pain with stretch of muscle
     c. Pain and spasm with more severe strains
  3. Sprain
     a. Marked swelling
     b. Loss of function
- Physical findings
  1. Strain—temporarily reduced range of motion, muscle strength
  2. Sprain
     a. Contusion, hemorrhage
     b. Reduced range of motion, muscle strength
     c. Joint instability in severe sprain or ruptured ligament
- Differential diagnosis
  1. Other overuse syndromes—tendonitis, shin splints
  2. Fracture
- Diagnostic tests/findings
  1. Radiograph to rule out fractures—negative for bony abnormality in strains/sprains
  2. MRI
- Management/treatment
  1. Nonpharmacologic
     a. RICE—initial therapeutic strategy for first 48 hours
        (1) Rest or immobilization of injured part
        (2) Ice or application of cold
        (3) Compression, elastic wrap
        (4) Elevation of affected area
     b. Application of alternating heat and cold after first two days
     c. Topical heat-generating liniments for symptomatic relief
  2. Pharmacologic—NSAIDs prn
  3. Patient education
     a. Physical training progression to avoid repeat injury
     b. Stretching and warm-up exercises
     c. Appropriate footwear, protective gear for exercise
- Referral
  1. Physical therapy for stretching and strengthening program
  2. Consult orthopedic surgeon if no response to conservative management
Neurologic Disorders

Headaches

- Definition
1. Headache/cephalagia is defined as diffuse pain in various parts of the head
2. Primary headaches—migraine, tension, cluster headaches are not directly related to a specific underlying cause or secondary to another problem, and not showing any red flag signs and symptoms
3. Secondary headaches are the result of identifiable structural or physiologic pathology

- Etiology/incidence/risk factors
1. Etiology
   a. Primary headaches—90–98% of headaches presenting in primary care
      (1) Migraine headache
         (a) Current understanding suggests genetic basis
         (b) Those genetically predisposed inherit a nervous system that is more sensitive/easily aroused to a variety of internal/external factors—hormonal fluctuations, weather changes, diet, psychosocial disruptions
         (c) Changes in serotonin activity result in release of vasoactive mediators; mediators produce an inflammatory response adjacent to cerebral blood vessels accompanied by vasodilation
         (d) The dilated vessels and inflammatory response stimulate the trigeminal nerve to transmit impulses to the brain resulting in migraine headache
      (2) Tension headache
         (a) Pathophysiology poorly understood; formerly attributed to contraction of the muscles of the scalp and neck
         (b) Recent theories suggest tension headaches may involve changes in the intracranial neurotransmitter and vascular systems similar to migraine
         (c) Symptom complex resulting from several simultaneous processes—muscle tension, psychological stress, neurovascular changes
      (3) Cluster headache
         (a) Secondary to serotonergic neurologic dysfunction
         (b) Clustering of attacks suggests involvement of circadian pacemakers of the anterior hypothalamus
         (c) Tearing and nasal stuffiness suggests abnormality in autonomic nervous system
   b. Secondary headaches
      (1) Vascular disorders—subarachnoid, cerebral, cerebellar hemorrhage; acute ischemic cerebrovascular disorder; arteriovenous AV malformation; temporal arteritis; arterial HTN
      (2) Nonvascular intracranial disorders—neoplasm; infection; low cerebrospinal fluid pressure/postlumbar puncture; benign intracranial HTN/pseudotumor cerebi
      (3) Traumatic—concussion and postconcussion; hematoma/subdural and epidural
      (4) Metabolic disorders—hypoxia, hypercapnia, hypoglycemia

- Incidence
2. Systemic—infection; allergies/pollen; hormonal

- Risk factors—primary headache syndromes
   a. Migraine headaches—female gender, family history
   b. Tension headaches—overuse of headache medications
   c. Cluster headaches—male, middle-aged or older

- Symptoms
1. Migraine
   a. Types
      (1) Migraine with aura/classic migraine
         (a) Aura consists of focal neurologic symptoms that may precede or accompany headache
         (b) Usually visual phenomenon; flashing lights, zigzag/jagged lines, difficulty focusing
         (c) May have a premonitory phase, occurring hours or days before the headache
      (2) Migraine without aura/common migraine—accounts for 75% of migraines
      (3) Complicated migraine—basilar/hemiplegic migraine
   b. Phases
      (1) Prodrome—occurs 24 hours prior to onset of headache: fatigue, euphoria, difficulty concentrating, irritability
      (2) Aura
      (3) Early and late stages of migraine
      (4) Postdrome—individual feels “wiped out,” fatigued, “hungover”
   c. Triggers
      (1) Stress
      (2) Hormonal changes
      (3) Certain foods, caffeine, alcohol, skipping meals
      (4) Fatigue, oversleeping
      (5) Medications
      (6) Changes in weather or barometric pressure
   d. Location—unilateral tendency
   e. Duration—four to 72 hours
   f. Character
      (1) Moderate to severe intensity; inhibits daily activities
      (2) Characterized as throbbing, pounding
   g. Associated symptoms—nausea, vomiting, photophobia, phonophobia, fatigue
   h. Frequency—recurrent, variable from two to three per year to two to three per week

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      (2) Hormonal changes
      (3) Certain foods, caffeine, alcohol, skipping meals
      (4) Fatigue, oversleeping
      (5) Medications
      (6) Changes in weather or barometric pressure
   d. Location—unilateral tendency
   e. Duration—four to 72 hours
   f. Character
      (1) Moderate to severe intensity; inhibits daily activities
      (2) Characterized as throbbing, pounding
   g. Associated symptoms—nausea, vomiting, photophobia, phonophobia, fatigue
   h. Frequency—recurrent, variable from two to three per year to two to three per week
2. Tension headache
   a. Onset—gradual
   b. Location—diffuse, bilateral, generalized
   c. Duration—variable, hours to days
   d. Character
      (1) Mild to moderate severity; generally able to continue with daily activities
      (2) Dull, pressure, constant, viselike
   e. Associated symptoms—fatigue, irritability, difficulty concentrating, neck and shoulder spasm
   f. Frequency
      (1) Episodic—less than 15 days per month
      (2) Chronic—must be present 15 days or more a month for at least six months

3. Cluster headaches
   a. Onset
      (1) Abrupt
      (2) Often nocturnal, awakens patient; often recurs at same time of day
   b. Location
      (1) Unilateral
      (2) During a series, pain remains on same side
      (3) Retro-orbital, sometimes radiating
   c. Duration—usually 30 to 45 minutes
   d. Character—intense, severe
   e. Associated symptoms—facial pain, ptosis of the affected side, lacrimation, nasal congestion
   f. Frequency—occurs in clusters lasting a few weeks, with remission lasting weeks to months

• Physical findings
  1. General appearance indicates discomfort
  2. Neurologic assessment normal in primary headaches—temporary focal neurologic findings with migraine may be present, but not common
  3. Blood pressure, vital signs normal
  4. Cluster headache—unilaterally constricted pupil, nasal discharge

• Differential diagnosis—“red flags” suggesting secondary causes
  1. Headache beginning after 50 years of age—temporal arteritis, infection, mass, lesion
  2. Sudden onset, worst headache ever experienced—subarachnoid hemorrhage, bleeding into a mass or AV malformation
  3. Headaches increasing in severity/frequency—mass, lesion, subdural hematoma, medication overuse
  4. Headache initiated by exertion such as coughing or straining or during sexual intercourse—mass, lesion, subarachnoid hemorrhage
  5. Focal neurological symptoms that do not resolve within 60 minutes of headache onset—intracranial mass or lesion
  6. Headache subsequent to head trauma—intracranial hemorrhage, subdural/epidural hematoma, post-traumatic headache
  7. Systemic illness/fever—meningitis, encephalitis, temporal arteritis

• Diagnostic tests/findings
  1. None indicated when examination is consistent with primary headache syndromes
  2. Erythrocyte sedimentation rate on all patients with new onset older than 40 years to rule out temporal arteritis
  3. CT/MRI
     a. Indicated if persistent focal neurologic findings or history of trauma
     b. CT preferred to identify acute hemorrhage
     c. MRI more sensitive in identifying pathologic intracranial changes
     d. Magnetic resonance angiography if aneurysm suspected—history of exertional headaches

• Management/treatment
  1. Nonpharmacologic
     a. Regular sleep and meal schedules
     b. Daily exercise
     c. Avoiding known triggers
  2. Pharmacologic
     a. Migraine—abortive therapy
        (1) First-line therapy—mild-to-moderate intensity
           (a) NSAIDs, acetaminophen
           (b) Combination analgesics—acetaminophen 250 mg/aspirin 250 mg/caffeine 65 mg—one tablet every six hours, not to take more than eight tablets/day
        (2) First-line therapy—moderate-to-severe intensity: triptans
           (a) Agents—sumatriptan, zolmitriptan, naratriptan, rizatriptan, almotriptan, frovatriptan; available in oral, nasal, subcutaneous (SC) forms
           (b) Drug action—selective serotonin agonists
           (c) Contraindications/precautions
              i. May initially cause tightness of the throat/chest, flushing, numbness, tingling, dizziness
              ii. Should not used within 24 hours of another triptan or any ergotamine-containing drug
              iii. Contraindicated with coronary artery disease; hypertension
              iv. Animal reproduction studies have shown an adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus
              v. Some concerns about use in late pregnancy association with preeclampsia, preterm birth, low birthweight, and postpartum hemorrhage; heavy bleeding following delivery
        (3) Second line—ergotamines
           (a) Agents—ergotamine, dihydroergotamine/parenteral and nasal spray
           (b) Drug action—nonspecific serotonin agonist and vasoconstrictor
           (c) Contraindications/precautions
              i. Do not give with triptan
              ii. Contraindicated with coronary artery disease; hypertension
              iii. Contraindicated during pregnancy
### Table 10-12 Commonly Used Anti-Epileptic Drugs (AEDs) (Representative List)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Action</th>
<th>Side Effects</th>
<th>Interactions</th>
<th>Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenytoin</td>
<td>Stabilizes membranes and prevents spread of seizure from hyperactive focus</td>
<td>Nystagmus, drowsiness, ataxia, diplopia, gingival hyperplasia, hirsutism, low folate level</td>
<td>Antagonizes oral contraceptives, digoxin, oral anticoagulants; potentiated by benzodiazepines, estrogens, H2 blockers; other AEDs</td>
<td>May block sinus bradycardia. May be teratogenic to fetus.</td>
</tr>
<tr>
<td>Carbamazepine</td>
<td>Delays recovery of sodium channels from their in activated state; inhibits sustained repetitive firing</td>
<td>Sedation, GI upset, ataxia, blurred vision, skin rash, aplastic anemia</td>
<td>Increased plasma levels with CYP3A4 inhibitors- INH, macrolides; decreased plasma levels with CYP3A4 inducers: phenytoin</td>
<td>Associated with bone marrow depression. Associated with neural tube defects and cleft palate in fetus.</td>
</tr>
<tr>
<td>Valproic acid</td>
<td>Increased brain levels of neurotransmitter GABA, which has an inhibitory effect on seizures</td>
<td>Nausea, vomiting, sedation, blood dyscrasias</td>
<td>Potentiates phenobarbital, phenytoin</td>
<td>Liver disease or dysfunction. Human teratogen associated with neural tube defects, mental and physical growth defects.</td>
</tr>
<tr>
<td>Clonazepam</td>
<td>Enhances GABA action; depresses neurotransmission in motor cortex</td>
<td>Fatigue, sedation, behavior changes—aggressiveness and confusion</td>
<td>Potentiates CNS depression with alcohol; antagonized by phenytoin, carbamazepine</td>
<td>Liver disease; acute angle-closure glaucoma; human data suggest low risk in pregnancy.</td>
</tr>
<tr>
<td>Topiramate</td>
<td>Enhances GABA action</td>
<td>Drowsiness, dizziness, ataxia, fatigue, visual disorders</td>
<td>Potentiates CNS depression with alcohol; potentiates phenobarbital, phenytoin, antagonized by carbamazepine, phenobarbital, phenytoin, valproic acid, verapamil</td>
<td>Acute myopia and secondary angle-closure glaucoma, hepatic or renal impairment, kidney stones. Human and animal data suggest risk, birth defects increased when combined with other antiepileptics; avoid during first trimester.</td>
</tr>
<tr>
<td>Gabapentin</td>
<td>Exact mechanism unknown; possibly increases GABA concentrations in some regions of the brain</td>
<td>Somnolence, dizziness, ataxia, fatigue</td>
<td>Not metabolized in humans; excreted unchanged in urine; no pharmacokinetic interaction with other AEDs; caution with cimetidine use due to decrease of glomerular filtration rate</td>
<td>Convulsions. Limited data about human pregnancy exist, but animal data suggest risk to fetus. However, benefits of therapy appear to outweigh potential risk to fetus.</td>
</tr>
<tr>
<td>Lamotrigine</td>
<td>Exact mechanism unknown; possible effects on voltage-sensitive sodium channels</td>
<td>Skin rash, may be severe; fever, malaise; flulike symptoms; drowsiness, visual disturbance, headache, nausea and vomiting; hallucination</td>
<td>Metabolism of lamotrigine may be inhibited by valproate, resulting in increased concentrations of lamotrigine, carbamazepine, phenytoin, or phenobarbital increase elimination of lamotrigine</td>
<td>Angioedema, lymphadenopathy, facial edema, hepatic dysfunction (rare), agitation, confusion. Data suggest risk to human fetus.</td>
</tr>
</tbody>
</table>


b. Migraine headache—prophylactic therapy: consider in patients who experience more than two severe headaches per month, need acute treatment medication more than two times per week, or are unable to tolerate abortive agents

(1) Beta blocker—propranolol/timolol (see Table 10-1)
(2) CCB—verapamil (see Table 10-1)
(3) Antiepileptic agents—valproic acid (see Table 10-12)

c. Tension—episodic

(1) NSAIDs, acetaminophen
(2) Combination caffeine, butalbital, acetaminophen (Fioricet)

(a) Drug action—butalbital is a barbiturate; muscle relaxant at lower doses, hypnotic at higher doses

(b) Contraindications/precautions

i. May cause drowsiness, lightheadedness
ii. Potentiates effects of alcohol, other central nervous system depressants
iii. Avoid use with hepatic impairment
iv. Animal reproduction studies have not been conducted; there are no controlled data in human pregnancy; use during pregnancy only if benefits outweigh potential risk to fetus
Neurologic Disorders

d. Tension—chronic
   (1) Tricyclic antidepressants (TCAs)—amitriptyline, nortriptyline
      (a) Drug action—increases synaptic concentration of serotonin and norepinephrine in CNS
      (b) Contraindications/precautions
         i. May cause sedation
         ii. Additive effect of anticholinergic drugs
         iii. Do not use with MAO inhibitors or if patient has impaired liver function
         iv. Animal reproduction studies have shown an adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus
   (2) Selective serotonin reuptake inhibitors—less effective than TCAs; see the section titled “Major Depressive Disorder (MDD)” in this chapter

3. Patient education
   a. Signs indicating need for emergency treatment
      (1) Acute fever with headache
      (2) Abnormal mental status or personality changes
      (3) Sudden onset; worst headache experienced
      (4) Neurologic symptoms (e.g., projectile emesis, visual disturbances)
   b. Self-medication for abortive therapy, injections
   c. Education regarding nonpharmacologic management—avoidance of precipitating factors
   • Referral
      1. Abnormal neurologic findings on physical examination
      2. Secondary cause is suspected
      3. Chronic headaches develop new features
      4. New headaches in individuals older than 50 years

Seizure Disorders

• Definition
   1. Disorder characterized by sudden, transient change in body functioning with or without loss of consciousness due to an abnormal discharge of neurons in the brain

2. Classification of seizures
   a. Partial seizures occur within localized regions of the brain; result of a localized physiologic or structural abnormality in the brain
      (1) Simple partial—consciousness not impaired
      (2) Complex partial—consciousness impaired
      (3) Partial with secondary generalization
   b. Generalized seizures arise from both sides of the brain simultaneously
      (1) Tonic-clonic (formerly grand mal)
      (2) Absence (formerly petit mal)
      (3) Myoclonic
      (4) Atonic
   • Etiology/incidence
      1. Etiology
         a. Congenital abnormalities or perinatal injuries
         b. Metabolic disorders—for example, hypoglycemia, hypocalcemia, acidosis, alcohol withdrawal
      c. Infectious diseases—for example, bacterial meningitis, herpes, encephalitis, neurosyphilis
      d. Head trauma
      e. Cerebral tumors
      f. Cerebrovascular disease
      g. Epilepsy is characterized by recurrent seizures; can be secondary to inherited or acquired factors or idiopathic

2. Incidence
   a. Recurrence rate widely variable, linked to etiology
   b. Complex partial seizures most common adult type
   c. Absence seizures most common in childhood

3. Risk factors
   a. Inherited neurologic disease
   b. History of trauma
   c. In persons with known seizure disorders
      (1) Sleep deprivation
      (2) Unusual stresses
      (3) Menstruation
      (4) Medications/drugs
   • Symptoms
      1. Partial seizures
         a. Simple partial
            (1) Lasts five to 10 seconds
            (2) No loss of consciousness; no postseizure confusion
            (3) Symptoms reflect focal area of brain affected
               (a) Jerking or shaking in one area of body; may progress as focus spreads along cortical motor strip
               (b) Somatosensory symptoms
               (c) Visual or auditory symptoms
               (d) Autonomic symptoms—sweating, epigastric discomfort
               (e) Psychic symptoms
         b. Complex partial
            (1) Duration—five to 10 seconds; one to two minutes; rarely more than five minutes
            (2) Loss of consciousness; postseizure confusion
            (3) Blank stare followed by an automatism (e.g., lip smacking, picking at clothing, purposeless walking)
      2. Generalized seizures—always involve loss of consciousness
         a. Tonic-clonic (grand mal) seizure
            (1) Tonic phase—all skeletal muscles contract and patient falls
            (2) Clonic phase
               (a) Repetitive motor activity of all extremities that may last two to three minutes
               (b) As clonic phases abate, muscles become flaccid and incontinence can occur
            (3) Postictal period
               (a) Consciousness may not return for 10–15 minutes
               (b) Confusion, headache, and fatigue may last from hours to days
         b. Absence (petit mal) seizure
            (1) Duration—five to 10 seconds; may cluster
            (2) Manifest with blank stare, eye blinking
            (3) No postseizure confusion
c. Myoclonic seizure
   (1) Quick, involuntary muscle jerks lasting a few seconds involving one body part or entire body
   (2) May accompany other generalized seizures; common to specific epilepsy syndromes

d. Atonic
   (1) Sudden loss of postural tone, causing patient to fall
   (2) Often associated with other seizure types; common in Lennox–Gastaut syndrome

• Physical findings
  1. Often no physical findings
  2. Focus physical examination on cardiovascular and neurologic systems
     a. Normal neurologic examination found in patients with idiopathic seizures
     b. Focal neurologic findings—brain lesion
  3. Hyperventilation/anxiety attacks
  4. Narcolepsy
  5. Psychogenic spells (e.g., transient global amnesia)

• Diagnostic tests/findings
  1. Electrolytes, glucose, BUN/creatinine, LFTs, calcium, magnesium
  2. Toxicology screen
  3. CBC
  4. Lumbar puncture if infection is a consideration
  5. CT can detect bleeding or gross structural lesions
  6. MRI is study of choice; more sensitive and specific for evaluating structural lesions and brain parenchyma
  7. Electroencephalogram (EEG)
     a. Used to establish presence and type of epilepsy
     b. Initial EEG abnormal in only 40% of patients with probable epilepsy

• Management/treatment
  1. Nonpharmacologic—avoidance of triggers
  2. Pharmacologic (see Table 10-12)
     a. Principles
        (1) Goal—complete suppression of seizures
        (2) Initial treatment—single drug
        (3) Blood levels should be monitored periodically
        (4) When adding a second drug, maintain the first drug, titrating dosages after second drug reaches therapeutic levels
        (5) Treatment withdrawal should not be considered until patient is seizure-free for a minimum of two years
     b. Pharmacologic management by seizure type
        (1) Partial seizures—carbamazepine, phenytoin, topiramate
        (2) Generalized seizures
           a. Tonic-clonic seizures—phenytoin, carbamazepine, valproic acid, topiramate
           b. Absence—valproic acid, ethosuximide
           c. Myoclonic—valproic acid, clonazepam
           d. Atonic—clonazepam
  3. Patient education
     a. Pregnancy and contraception
        (1) Impact on seizure frequency, severity variable
        (2) Teratogenic effects of seizure medications
        (3) Decreased combination hormonal contraceptive efficacy with many anti-seizure medications; select backup or alternative method
     b. Safety issues regarding recurrent seizures
        (1) Activity limitations (e.g., driving)
        (2) Possible need for protective wear
        (3) Household hazards identification and modification
     c. Medication schedules and side effects

• Referral
  1. All clients with first-time seizures
  2. Uncontrolled seizures
  3. For EEG and interpretation
  4. Suspected underlying metabolic disease, neural lesion

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Dermatologic Disorders

Acne

• Definition—a common self-limited disease that presents with a variety of lesions, including open and closed comedones, papules and pustules, nodules, and cysts

• Etiology/incidence/risk factors
  1. Etiology
     a. Primary cause is obstruction of the pilosebaceous follicle
     b. Characterized by plugging of the hair follicle with abnormally cohesive desquamated cells, sebaceous gland hyperactivity, proliferation of bacteria (P. acnes), and inflammation
     c. Obstruction of follicle leads to development of noninflammatory acne—closed comedones/white heads and open comedones/black heads
     d. Proliferation of P. acnes/rupture of follicle wall results in inflammatory acne with papules, pustules, nodules, cysts
  2. Incidence
     a. Affects up to 90% of teens; 15% have moderate to severe acne
     b. May persist to older than 40 years in some, especially women
  3. Contributing/aggravating factors—hormonal cycles, topical or oral corticosteroids, irritant oils or cosmetics

• Symptoms
  1. Erythematous lesions, sometimes tender
  2. May be episodic, cyclic in severity
  3. Distribution and severity tend to be similar in family members

• Physical findings
  1. Lesions occur primarily on the face, but neck, shoulders, chest, and back may be involved
  2. Mild—open and closed comedones without inflammation
  3. Moderate—comedones with papules and pustules
  4. Severe—comedones, papules and pustules with nodules, cysts, and scarring
• Differential diagnosis
  1. Rosacea
  2. Pyoderma
  3. Drug eruptions
  4. Underlying endocrine disease—polycystic ovarian syndrome, Cushing’s syndrome
  5. Folliculitis
  6. Perioral dermatitis
• Diagnostic tests/findings—none indicated
• Management/treatment
  1. Varies depending on severity of condition
  2. Nonpharmacologic—cleansing
  3. Pharmacologic
    a. Mild acne—topical medications alone or in combination
      (1) Benzoyl peroxide
        (a) Drug action—antibacterial and comedolytic properties
        (b) Contraindications/precautions
          i. May cause skin irritation, allergic dermatitis
          ii. May bleach clothing/bed linens, hair
          iii. Use with para-aminobenzoic acid (PABA) sunscreens may temporarily discolor skin
          iv. Avoid eyes, mouth, mucous membranes
          v. May use during pregnancy; minimal systemic absorption
        (2) Retinoic acid derivatives—tretinoin/cream, gel, lotion, and microspheres; adapalene gel/solution; tazarotene gel
          (a) Drug action—comedolytic agent
          (b) Contraindications/precautions
            i. May cause local irritation, erythema, scaling
            ii. Avoid UV light, sun, extreme weather
            iii. Do not use with eczema
            iv. Not recommended during pregnancy, although systemic absorption is likely minimal
    b. Moderate acne—topical antibiotics combined with benzoyl peroxide and retinoic acid derivative (clindamycin, erythromycin)
      (1) Drug action—bactericidal effects
      (2) Contraindications/precautions
        (a) Avoid eyes, mucous membranes
        (b) Do not use clindamycin if patient has history of regional enteritis, ulcerative or antibiotic-induced colitis
        (c) May use during pregnancy; minimal systemic absorption
    c. Moderate to severe acne—oral medications
      (1) Oral antibiotics—doxycycline, minocycline
        (a) Drug action (tetracycline and its derivatives)—antibacterial and anti-inflammatory effect
        (b) Contraindications/precautions
          i. May cause photosensitivity
          ii. Reduced absorption with antacids
          iii. Tetracycline and its derivatives are contraindicated during pregnancy
      (2) Oral combination hormonal contraceptives—some have FDA approval for treatment of moderate acne in women who also desire contraception; all with low androgenic or antiandrogenic progestin are likely effective
        (a) Drug action—antiandrogenic/decreases free testosterone available for metabolism in sebaceous glands
  (b) See Chapter 4 for side effects, drug interactions, contraindications
d. Severe cystic acne—oral isotretinoin
  (1) Drug action—decreases size and secretion of sebaceous glands, normalizes follicular keratinization, inhibits P. acnes, and modulates the inflammatory response
  (2) Contraindications/precautions
    (a) May cause skin and mucosal dryness
    (b) Use with tetracyclines may increase incidence of pseudotumor cerebri
    (c) Contraindicated during pregnancy and lactation
• Referral—severe acne; may refer patients requiring treatment with isotretinoin

Contact Dermatitis
• Definition—skin inflammation due to irritants (irritant contact dermatitis) or allergens (allergic contact dermatitis)
• Etiology/incidence
  1. Irritant contact dermatitis
    a. Eczematous response that is nonallergic caused by irritants, including chemicals, dry and cold air, and friction
    b. May occur acutely; occurs more commonly after chronic exposure
  2. Allergic contact dermatitis
    a. A manifestation of cell-mediated hypersensitivity; causes delayed reaction on first exposure
    b. Rhus plant antigens (poison oak, poison ivy) result in clinical eruption in 12–72 hours and within minutes on reexposure
    c. Other common allergic sensitizers include nickel (jewelry), rubber compounds (gloves), cosmetics, topical medications
  3. Most (80%) of contact dermatitis cases are due to contact with local irritants
• Symptoms
  1. Report of recent exposure (within 24 hours) to known allergens; exposure to irritants
  2. Pruritus
• Physical findings
  1. Irritant contact dermatitis
    a. Mild irritants cause erythema, dryness, fissuring
    b. Chronic exposure may cause oozing, weeping lesions
  2. Allergic contact dermatitis
    a. Classic lesions are vesicles and blisters on erythematous base
    b. Linear eruption is the hallmark of most plant dermatoses
  3. Distribution often provides clues to diagnosis
• Differential diagnosis
  1. Atopic dermatitis, eczema
  2. Tinea
  3. Scabies/pediculosis
  4. Herpes simplex/herpes zoster
• **Symptoms**
  1. BCC and SCC—painless, slow-growing lesion that will not heal on sun-exposed areas or skin damaged by burns or chronic inflammation
  2. MM
    a. Changing nevus; change in color, diameter increase, or border outline
    b. Pruritus is early symptom
    c. Bleeding, ulceration, discomfort are late signs
    d. Location of melanoma commonly on skin but also found in eyes, ears, mucosal membranes of the mouth and genitals

• **Physical findings**
  1. BCC—several clinical variants; nodular basal cell most common
    a. Waxy, semitranslucent nodule with rolled borders
    b. Central ulcerations; telangiectasias
  2. SCC
    a. Red/reddish brown plaque/nodule
    b. Surface is scaly/crusted with erosions or ulcerations
  3. MM—tends to have **Asymmetry**, **Border irregularity**, **Color variations**, **Diameter** greater than 6 mm, and **Elevation** (ABCDE)
    a. Superficial spreading type/70%—prolonged horizontal growth phase; vertical growth occurs later
    b. Nodular—raised, pigmented (blue, black, dark brown, gray) nodules with normal surrounding skin
    c. Acral lentiginous—found on palms, soles, nail beds, mucous membranes
    d. Lentigo melanoma—occurs in preexisting lentigo maligna

• **Differential diagnosis**
  1. Common melanocytic nevus
  2. Seborrheic keratosis
  3. Dermatofibroma

• **Diagnostic tests/findings—biopsy**

• **Management/treatment**
  1. **Nonpharmacologic/pharmacologic**
    a. Excision and biopsy of lesions
    b. BCC/SCC—treatment options
      1. Mohs’ micrographic surgery—gradual lesion excision using serial frozen section analysis and mapping of excised tissue until tumor-free plane reached
      2. Cryotherapy
      3. Curettage with electrodesiccation/freezing
      4. 5-FU or imiquimod
    c. MM
      1. Excision of lesion
      2. Lymph node dissection
      3. Adjunctive therapy—chemotherapy, radiation, excision of metastasis
      4. Long-term follow-up
  2. Patient education—focused on prevention
    a. Reduce exposure
      1. Avoid UVB exposure—sun or tanning salon
      2. Use of sunscreen with sun protective factor (SPF) of 15 or greater
      3. Protective clothing

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**Skin Cancer**

• **Definition**—malignant neoplasms arising in skin cells

• **Etiology/incidence**
  1. **Etiology**
    a. Basal cell carcinoma (BCC)
      1. Slow growing, rarely metastasizes, but may cause extensive local tissue damage
      2. Tumor arises in basal layer of epidermis; causes include chronic sun exposure and genetic predisposition
    b. Squamous cell carcinoma (SCC)
      1. Directly attributable to sun exposure or chronic irritation
      2. Sixty percent occur at site of previous actinic keratoses
      3. Low tendency for metastasis
    c. Malignant melanoma (MM)
      1. Arises from cells of the melanocyte system; begins either de novo or develops from preexisting lesion; may have genetic predisposition
      2. Initially grows superficially and laterally; enters vertical growth phase with potential to metastasize
  2. **Incidence**
    a. BCC approximately 75% all skin cancers, affects about 1 million people per year in the United States; increased risk in fair-skinned individuals with tendency to sunburn easily
    b. SCC second most common skin cancer in whites; most common skin cancer in blacks especially on plantar surface of feet; increased risk of oral and lip SCC in cigarette and cigar smokers
    c. MM represents 1% of skin cancers; 77% of skin cancer deaths
Tinea/Dermatophytosis

- Definition
  1. Superficial fungal infection caused by dermatophytes and yeasts
  2. Dermatophytes require keratin for growth; infection restricted to hair, superficial skin, and nails
  3. Classified according to involved anatomic location
     a. Tinea capitis—scalp
     b. Tinea corporis—body
     c. Tinea cruris—upper inner thigh/spares scrotum
     d. Tinea pedis—toe webs; soles/heels
     e. Tinea unguium—toenails more frequently involved than fingernails
- Etiology/incidence
  1. Etiology
     a. Microsporum, Trichophyton, Epidermophyton species
     b. Transmission via contact with infected persons, fomites (shoes, towels, shower stalls), animals, or soil
  2. Incidence
     a. Tinea capitis more common in children
     b. Tinea cruris and tinea pedis—increased incidence in hot, humid conditions
     c. Tinea unguium—increased incidence in older adults, those with diabetes, use of poorly fitting shoes
- Symptoms
  1. Itching, burning variable
  2. Inflamed, tender rash
  3. Dependent on area of involvement—hair loss on scalp, thickened nails
- Physical findings
  1. Classic presentation is a lesion with central clearing surrounded by an advancing, red, scaly, elevated border
  2. Scalp lesions characterized by hair loss/scaling
  3. Maceration, especially intertriginous lesions
  4. Involved nails are yellowish/thickened with subungual debris
- Diagnostic tests/findings
  1. Potassium hydroxide (KOH) microscopy positive for hyphae
  2. Fungal culture for specific identification

3. Wood's lamp of limited usefulness; most dermatophytes currently seen in United States do not fluoresce
- Management/treatment
  1. Nonpharmacologic
     a. Careful nail and skin care
     b. Keep area dry; wear absorbent clothing
  2. Pharmacologic
     a. Topical antifungals—tinea corporis, tinea cruris, tinea pedis
        (1) Azoles—clotrimazole, ketoconazole, miconazole
           (a) Drug action—fungicidal activity
           (b) Contraindications/precautions
              i. May cause pruritus, irritation, stinging
              ii. May use during pregnancy; minimal systemic absorption
        (2) Allylamines—naftifine, terbinafine, butenafine
           (a) Drug action—fungicidal activity
           (b) Contraindications/precautions
              i. May cause burning, stinging, dryness
              ii. May use during pregnancy; minimal systemic absorption
     b. Oral antifungals—tinea capitis, tinea unguium
        (1) Griseofulvin
           (a) Drug action—interferes with fungal microtube formation by disrupting mitosis and cell division
           (b) Contraindications/precautions
              i. May cause photosensitivity
              ii. May reduce effectiveness of oral contraceptives
              iii. Contraindicated with porphyria; hepatic function impairment
              iv. Contraindicated during pregnancy
        (2) Itraconazole
           (a) Drug action—decreases ergosterol synthesis, inhibiting cell membrane formation
           (b) Contraindications/precautions
              i. Inhibits drug-metabolizing enzymes/CYP3A4; may increase levels of other drugs
              ii. Contraindicated with hepatic function impairment
              iii. Contraindicated during pregnancy
  3. Patient education
     a. Keep skin as dry as possible, especially intertrigal spaces
     b. Wear loose, clean, absorbent clothing
     c. Contagious nature of condition

Psoriasis

- Definition—chronic immune-mediated disorder with overgrowth of keratinocytes and accompanying inflammation; has recurrent exacerbations and remissions; associated with systemic manifestations, especially arthritis
- Etiology/incidence
  1. Genetic predisposition
  2. Environmental triggers for flares—stress, trauma, infection, medications, smoking
  3. Onset most common between ages 15 and 30 years
  4. Incidence in United States is 2–3% of adult population
5. Approximately 5% develop psoriatic arthritis; average 12 years after onset of skin lesions
6. Prevalence of depression is up to 60%; may improve with psoriasis treatment

- Symptoms
  1. Red papules and plaque, with elbows, knees, and scalp most commonly affected
  2. Severe pruritus when occurs in folds of skin—axillae, groin, antecubital and popliteal fossae
  3. Constitutional symptoms—joint pain, fever, chills

- Physical exam findings
  1. Lesions have four prominent features
     a. Sharp demarcated with clear-cut borders
     b. Erythematous plaque base
     c. Overlapping silvery scales
     d. Removal of scales results in small blood droplets—Auspitz sign
  2. Fingernails—stippling or pitting; accumulation of yellow debris under nails; swelling and redness of paronychial margins

- Diagnostic tests/findings
  1. Generally not needed with classic presentation
  2. Biopsy for uncertain diagnosis

- Management/treatment
  1. Determined by type and severity
  2. Goals—improvement of skin, nail, and joint lesions and improvement of quality of life
  3. Nonpharmacologic—phototherapy with sun exposure or ultraviolet B radiation
  4. Pharmacologic
     a. Mild to moderate disease affecting < 5% of body, sparing genitals, face, hands, and feet; generally treated with topical medications either intermittent or continuous
        (1) Most commonly used are steroids, retinoid gel, vitamin D₃ analogs, and calcineurin inhibitors; less commonly used are nonmedicated moisturizers, salicylic acid, coal tar, and anthralin
     b. Topical steroids—often combined with emollients to soften skin and prevent infection
        (2) Topical steroids analogs—calcipotriene ointment or solution
        (a) Drug action—blocks production of procollagen, decreases number of inflammatory mediators, unblocks clogged pores; exact mechanism of action unknown
        (b) Contraindications/precautions
           i. May cause alopecia, skin dryness, peeling
           ii. Contraindicated during pregnancy
     (3) Retinoid gel—tazarotene
        (a) Drug action—blocks production of procollagen, decreases number of inflammatory mediators, unblocks clogged pores; exact mechanism of action unknown
        (b) Contraindications/precautions
           i. May cause alopecia, skin dryness, peeling
           ii. Contraindicated during pregnancy
     (4) Topical vitamin D₃ analogs—calcipotriene ointment or solution
        (a) Drug action—blocks production of procollagen, decreases number of inflammatory mediators, unblocks clogged pores; exact mechanism of action unknown
        (b) Contraindications/precautions
           i. May cause itching, skin irritation, peeling
           ii. Increased risk for kidney stones in susceptible individuals; avoid use for these individuals

iii. Animal reproduction studies have shown an adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus

(5) Calcineurin inhibitors (tacrolimus, pimecrolimus)—first line for facial psoriasis, with less skin atrophy than steroids
   (a) Drug action—immunosuppressant agent selectively inhibiting inflammation through action on T-cell activation
   (b) Contraindications/precautions
      i. May cause skin irritation, erythema
      ii. Conflicting data that long-term use may increase risk of some cancers; only use short term and if other topical therapies not effective
   iii. Animal reproduction studies have shown an adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus

b. Severe disease—generalized lesions covering >5% of body surface or involving hands, feet, face or genitals; generally treated with systemic medications combined with phototherapy
   (1) Most commonly used medications are biologic immune modulators, methotrexate, cyclosporine
   (2) Biologic immune modulators—adalimumab, etanercept, infliximab
      (a) Drug action—stimulate body’s immune system to block production of T cells or tumor necrosis factor alpha affecting progression of psoriatic plaques; administered by injection or infusion
      (b) Contraindications/precautions
         i. May cause flu-like syndrome; injection-site inflammation
         ii. Animal reproduction studies have not revealed any fetal damage or fertility impairment, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus
   (3) Methotrexate—antimetabolite and antifolate agent acts by decreasing production of new skin cells, in turn by interfering with cellular metabolism; contraindicated during pregnancy and lactation
   (4) Cyclosporine—immunosuppressant that inhibits lymphocytes, decreasing T-cell infiltration of the dermis; contraindicated during pregnancy and lactation

5. Patient education
   a. Chronic nature of condition
   b. Reduction of triggers
   c. Emotional support
   d. Medications

6. Referral
   a. Dermatologist for severe disease or mild to moderate disease not controlled with topical medications
   b. Rheumatologist if patient has arthritis symptoms
Psychosocial Problems

Stress
- Definition—Selye’s theory of stress response and adaptation describes a continuum related to stress
  1. Eustress or good stress—degree of stress that is motivating and viewed as positive for the individual
  2. Distress—point at which stress becomes psychologically or physically debilitating
- Etiology/incidence
  1. Major life events—marriage, divorce, job change, death of a family member
  2. Chronic situations—poverty, illness of self or family member, abuse
  3. Acute situations—acute pain, sudden threats to safety
  4. Environmental conditions—noise, pollution, overcrowding
  5. Daily hassles—minor events that occur on a regular basis
- Symptoms
  1. Irritability, anxiety, depression, chronic worrying
  2. Decreased productivity, sleep disturbances, appetite changes, loss of libido
  3. Vague or nonspecific physical complaints—headaches, nausea, diarrhea, chest pain, muscle tension
- Physical findings
  1. Muscle tension
  2. Increase in blood pressure
- Differential diagnosis
  1. Depression
  2. Anxiety disorders
  3. Other medical conditions that could account for signs and symptoms
- Diagnostic tests/findings—none
- Management/treatment
  1. Eliminate or modify stressors—assertiveness training, time management, positive thought strategies, communication skills
  2. Relaxation techniques—guided imagery, muscle relaxation exercises, biofeedback, massage, meditation, use of humor, physical exercise

Anxiety
- Definition—Diagnostic and Statistical Manual of Mental Disorders (DSM-5) lists several psychiatric syndromes of which anxiety is a primary component; interference with everyday function must be present to classify anxiety as a psychiatric syndrome
  1. Generalized anxiety disorder (GAD)
    a. Persistent, excessive, incapacitating worry over life events, occurring more days than not, for at least six months
    b. Anxiety and worry are associated with three or more of the following symptoms: restlessness, easy to fatigue, difficulty concentrating, irritability, muscle tension, sleep disturbance
  2. Panic attack
    a. Period of intense fear or discomfort, develops abruptly and peaks within 10 minutes
    b. At least four of the following symptoms must be present—palpitations, sweating, trembling, sensation of shortness of breath/smothering, choking sensation, chest pain, nausea/abdominal distress, dizziness/light-headedness, derealization, fear of losing control, sense of impending doom, paresthesias, chills/hot flashes
  3. Panic disorder
    a. Recurrent, unexpected panic attacks—not due to substance abuse, medical condition, or other mental disorder
    b. At least one attack followed by at least one month of one more of the following
      1) Persistent concern about having other panic attacks
      2) Worry about implications of attack and its consequences
      3) Significant change in behavior related to attacks
    c. May occur with or without agoraphobia
  4. Specific phobia—anxiety elicited by a discrete stimulus such as heights or specific animals; individual recognizes that the fear is excessive or unreasonable
  5. Social phobia—fear of one or more social and performance situations that is excessive or incapacitating; individual recognizes the fear is excessive or unreasonable
  6. Post-traumatic stress disorder (PTSD)—persistent anxiety lasting more than one month following an extremely traumatic event; symptoms may not start until several days or weeks after the event
    a. Exposure to a traumatic event in which the patient experienced, witnessed, or was confronted with event that involved actual or threatened death, serious injury, or threat to physical integrity of others
    b. Traumatic event persistently reexperienced through at least one of the following ways
      1) Intrusive distressing recollections of event
      2) Distressing dreams
      3) Feeling as if traumatic event was recurring
      4) Psychological distress when exposed to cues symbolizing event
    c. Avoidance of stimuli associated with trauma and numbing of general responsiveness
    d. Persistent symptoms of increased arousal
- Etiology/incidence/prevalence
  1. One of the most prevalent of all psychiatric disorders
  2. Prevalence varies with specific phobia most common (25%), social phobia (13%), PTSD (7.8%; 12% in women, 20% in victims of war trauma), GAD (5%), panic disorder (3.5%)
3. Disrupted modulation of the central nervous system with several neuroregulators implicated in the cause of anxiety (e.g., dopamine, serotonin, norepinephrine)
4. May be a genetic predisposition

- Symptoms—vary with the particular anxiety disorder
- Physical findings
  1. Physical findings may be present with an acute anxiety attack
  2. Tachycardia, increased respirations, elevated BP
  3. Restlessness
  4. Diaphoresis
  5. Muscle tension
- Differential diagnosis
  1. Medical conditions that may account for symptoms of anxiety—cardiac arrhythmias, mitral valve prolapse, angina, pulmonary embolism, hypoglycemia, hyperthyroidism, asthma, COPD, Cushing’s disease, pheochromocytoma
  2. Medication-induced symptoms of anxiety—steroids, anticholinergics, sympathomimetics, digoxin, thyroxine
  3. Substance abuse or withdrawal
  4. Other psychological disorders—depression, bipolar disorder
- Diagnostic tests/findings
  1. May be done to exclude other medical conditions suggested by history/physical examination findings
  2. TSH, urine toxicology, ECG, CBC, metabolic panel
- Management/treatment
  1. Nonpharmacologic—psychotherapy/cognitive behavioral therapy
  2. Pharmacologic
    a. Benzodiazepines (lorazepam, diazepam, clonazepam, alprazolam) for short-term management if needed for severe impairment until acceptable reduction of symptoms is achieved with selective serotonin reuptake inhibitors (SSRIs) and/or cognitive behavioral therapy
    (1) Drug action—produce an antianxiety effect by enhancing the action of the neurotransmitter GABA acid at the cortical and limbic areas of the brain
    (2) Contraindications/precautions
      a. May cause sedation, impaired concentration, anterograde amnesia; dependence; abuse potential
      b. Potentiates effect of other CNS depressants, including alcohol
      c. May be potentiated by concomitant use of cimetidine
      d. Risk for rebound anxiety with withdrawal of alprazolam because of short half-life
      e. Not recommended for use during pregnancy; an increased risk of congenital malformations in humans has been suggested; withdrawal syndrome has been described in neonates whose mothers took benzodiazepines during pregnancy
    b. SSRIs—paroxetine, venlafaxine, sertraline; see the section titled “Major Depressive Disorder (MDD)” in this chapter; best tolerance and response rates for GAD, panic disorder, PTSD, OCD, social anxiety disorder
  c. Serotonin and norepinephrine reuptake inhibitors (SNRIs)—duloxetine, venlafaxine; see the section titled “Major Depressive Disorder (MDD)” in this chapter
  d. Buspirone—nonbenzodiazepine antianxiety agent
    (1) Drug effect—partial agonism or mixed agonism/antagonism at 5-HT1A receptors
    (2) Contraindications/precautions
      a. Increased risk for hypertensive crisis with concomitant use of MAO inhibitors
      b. Animal reproduction studies have not revealed any fetal damage or fertility impairment; there are no controlled data in human pregnancy
  e. MAO inhibitors

3. Client education
   a. Caution about potential for physical/psychological dependence with use of benzodiazepines
   b. Caution against use of alcohol or other CNS depressants with benzodiazepines
   c. Discuss the use of relaxation techniques and effective coping mechanisms
   d. Reassurance that effective treatment is available, but patience required until the right combination of modalities is found

**Major Depressive Disorder (MDD)**

- Definition (DSM-5)—at least five of the symptoms listed must be present most of the day, nearly every day, for two weeks and number 1 or number 2 must be present for a diagnosis of major depression
  1. Sad or depressed mood most of the day, every day
  2. Loss of interest in usual activities
  3. Fatigue, weight gain/loss, sleep disturbance, difficulty concentrating, feelings of worthlessness/guilt, psychomotor retardation/ agitation, suicidal ideation
- Etiology/incidence/prevalence/risk factors
  1. Lifetime prevalence of clinically significant MDD is 16%; women affected two to three times more than men
  2. First major depressive episode usually occurs in adolescence or early adulthood
  3. Bimodal curve of prevalence—one peak in late twenties and early thirties and a second peak around 65 to 70 years of age
  4. Theories include biologic, sociologic, and neuroendocrine etiologies
- Risk factors for depression include
  a. Prior incident of major depression
  b. Family history of depression
  c. Severe or chronic illness/chronic pain
  d. History of early trauma, abuse, neglect, deprivation
  e. Current high stress burden (e.g., marital or family problems, abuse)
  f. Postpartum period—see Chapter 8, “Intrapartum and Postpartum,” on postpartum depression
- Fifteen percent of depressed individuals attempt suicide
- Risk factors for suicide include
  a. Prior attempt/family history of suicide attempt
  b. Male gender
  c. Substance abuse/family history of substance abuse
• Symptoms
  1. As listed in definition
  2. Vague pain, headaches, GI complaints, sexual complaints
  3. Substance abuse or dependence

• Physical findings
  1. Poor eye contact, tearful, downcast
  2. Inattention to appearance/hygiene
  3. Slow, monotone speech
  4. Psychomotor retardation or agitation
  5. Impaired cognitive reasoning

• Differential diagnosis
  1. Adjustment disorder following a stressor event
  2. Bereavement or grief reaction
  3. Dysthymia
    a. Chronic low-grade depressive symptoms for two or more years
    b. Insufficient number and intensity of symptoms to qualify as MDD
    c. Often accompanies chronic, disabling medical disorders
  4. Other psychiatric syndromes
  5. Medical disorders—thyroid disorders, sleep apnea, Parkinson's disease, multiple sclerosis
  6. Medications—, antihypertensives, benzodiazepines, chemotherapeutic drugs, and others

• Diagnostic tests/findings
  1. Laboratory/diagnostic tests may be done to exclude other diagnostic possibilities
    a. CBC
    b. TSH
    c. Glucose
  2. Screening tools—depression assessment scales
    a. Ask patients to rate severity or frequency of various symptoms
    b. Beck Depression Inventory, Zung Self-Rating Depression Scale, Geriatric Depression Scale, Patient Health Questionnaire (PHQ) 9, Edinburgh Postnatal Depression Scale

• Management/treatment
  1. Nonpharmacologic—psychotherapy, regular exercise, light therapy for seasonal affective disorder (subtype of MDD), neuromodulation techniques (e.g., electroconvulsive therapy, vagus nerve stimulation); hospitalization may be required for severe depression or if client has suicidal ideation
  2. Pharmacologic
    a. SSRIs have replaced TCAs as the drugs of choice because of their improved tolerability and safety if taken in overdose
      (1) Agents—fluoxetine, sertraline, paroxetine, citalopram, escitalopram

  (2) Drug action—block reuptake of serotonin, enhancing serotonin neurotransmission
  (3) Contraindications/precautions
    a. May cause sexual dysfunction
    b. Use with MAO inhibitors may cause hypertensive crisis
    c. Screen for symptoms of bipolar disorder before prescribing to avoid precipitating a manic episode
    d. Animal reproduction studies have shown an adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus; exception is contraindication to use of paroxetine
    e. Discuss with pregnant woman the balance of benefits and risks of not treating depression versus use of SSRI during pregnancy

b. SNRIs
  (1) Agents—venlafaxine, duloxetine

  (2) Drug action—inhibits both serotonin and norepinephrine reuptake
  (3) Contraindications/precautions
    a. May cause sexual dysfunction
    b. Use with MAO inhibitors may cause hypertensive crisis
    c. Contraindicated with uncontrolled narrow-angle glaucoma
    d. Animal reproduction studies have shown an adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus
    e. Discuss with pregnant woman the balance of benefits and risks of not treating depression versus use of SSRI during pregnancy
c. Other classes of antidepressants
  (1) Mirtazapine
    a. Drug action—stimulates release of norepinephrine and serotonin
    b. Contraindications/precautions
      i. May cause dizziness, orthostatic hypotension, transient sedation
      ii. Animal reproduction studies have shown an adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus

  (2) Bupropion
    a. Drug action—decreases reuptake of dopamine in the CNS
    b. Contraindications/precautions
      i. May cause agitation, headache, nausea
      ii. Contraindicated with seizure disorder, eating disorders
      iii. Animal reproduction studies have shown an adverse effect on the fetus, but there are no adequate and well-controlled studies in humans; use during pregnancy only if benefits outweigh potential risk to fetus

d. Once full remission achieved, continue therapy for six to 12 months; for second episode, continue therapy for one to two years; a third episode requires indefinite maintenance
Domestic Violence/Intimate Partner Violence (IPV)

- Definition—a pattern of coercive and controlling behavior that occurs in an intimate adult relationship; four main types: physical violence, sexual violence, threats of physical or sexual violence, psychological/emotional violence
- Etiology/incidence/prevalence
  1. Societal, community, relationship, and individual factors all contribute to the etiology of IPV and must be addressed as part of the ecological model of violence prevention
  2. One in three women has been the victim of severe physical violence by an intimate partner in her lifetime
  3. IPV is the single most common reason women go to emergency rooms
  4. Twelve percent of teenagers and more than 20% of college students have experienced dating violence
  5. Evidence of whether IPV increases or decreases during pregnancy is conflicting
  6. Associated impacts on pregnancy include preterm delivery, low birthweight, delayed prenatal care, substance abuse
  7. Eighty percent of women who have experienced IPV suffer significant short- or long-term psychological impacts, including PTSD, depression, fear of intimacy, inability to trust others, low self-esteem, sleep disturbances, suicidal behavior, substance abuse
  8. Gastrointestinal and gynecologic disorders, headaches, sexual dysfunction, and chronic pain syndromes are common in women who have experienced IPV

- Symptoms
  1. History of frequent visits to emergency room
  2. Evidence of current or old injuries
  3. Delay in reporting an injury/explanation of cause inconsistent with injury
  4. Depression, anxiety, post-traumatic stress reactions, low self-esteem
  5. History of suicide attempts or ideation
  6. Alcohol or drug abuse
  7. Vague or nonspecific physical complaints
  8. Late/sporadic prenatal care or other health care
  9. Controlling partner/increased anxiety in presence of partner
  10. Behavioral problems in children who are witnessing the abuse
  11. Cycle of violence—tension building, serious battering incident, honeymoon phase

- Physical findings
  1. Facial lacerations
  2. Injuries to breasts, back, abdomen, and genitalia
  3. Bilateral injuries to arms/legs
  4. Obvious patterns—bite marks, hand grip, cigarette burns
  5. Injuries during pregnancy
  6. Recurrent or chronic injuries

- Differential diagnosis
  1. Accidental injuries
  2. Self-inflicted injuries

- Diagnostic tests/findings—none

- Management/treatment
  1. Routine assessment for abuse in all women
  2. Danger assessment—suicide or homicide
  3. Safety plan—where to go in an emergency or dangerous situation; what to do during violent incidents; what items/documents will be needed for a comfortable and safe escape
  4. ABCDEs of intervention
    a. Alone—assure the woman that she is not alone in being a victim of domestic violence
    b. Belief—let the woman know that you believe no one deserves to be hurt or threatened in a relationship
    c. Confidential—assure the woman that the information she shares is confidential
    d. Document—record any findings that may be helpful to the woman at a later date; use accurate description of incident and/or threats in patient’s own words; include all pertinent physical examination findings with body map and/or photographs, with woman’s permission
    e. Educate—provide information about available resources, dangers of escalating violence, and safety plans
  5. Referrals
    a. Shelters
    b. Legal assistance
    c. Counseling
  6. Mandatory reporting—laws vary in each state

Sexual Violence

- Definition—any sexual act that is committed against someone without that person’s freely given consent; may be physical, verbal, or psychological
  1. Types of sexual violence—CDC (Rosile, Smith, Breiding, Black, & Mahendra, 2014)
    a. Completed or attempted forced penetration of a victim
    b. Completed or attempted alcohol/drug-facilitated penetration of a victim
    c. Completed or attempted forced acts in which a victim is made to penetrate a perpetrator or someone else
d. Completed or attempted alcohol/drug-facilitated acts in which a victim is made to penetrate a perpetrator or someone else

e. Nonphysically forced penetration that occurs after a person is pressured verbally or through intimidation or misuse of authority to consent or acquiesce

f. Unwanted sexual contact—intentional touching, directly or through clothing of genitalia, anus, groin, breast, inner thigh, or buttocks

g. Noncontact unwanted sexual experiences—voyeurism, exposure to exhibitionism, pornography, sexual harassment, threats of sexual violence

2. Legal terminology—varies from state to state

a. Sexual assault—force, threats, or coercion to engage in any unwanted sexual contact; includes contact or penetration of the intimate parts (sexual organs, anus, groin, buttocks, and breasts)

b. Rape—sexual assault that involves penetration, however slight, of the labia by the penis; legal definitions of rape vary from state to state but typically include the use of force, threat, or coercion and lack of consent by the victim in relation to sexual intercourse

- Etiology/incidence
  1. Sexual violence occurs in all age, race, ethnic, and cultural groups
  2. Approximately 18% of women in United States have experienced a completed or attempted act of sexual violence in their lifetime; majority perpetrated by an acquaintance rather than a stranger

- Symptoms—sexual assault
  1. Genital injury may or may not be present and is often difficult to visualize
  2. Typical findings include lacerations, ecchymosis, abrasions, erythema, and edema in areas of assault
  3. Rape trauma syndrome describes the symptoms that occur in most survivors of sexual assault
    a. Acute phase—lasts a few days to a few weeks
      (1) Emotional responses may be expressed or controlled, and may range from anger, fear, anxiety, and restlessness to a calm, composed, subdued affect
      (2) Physical responses include general soreness and soreness in the areas of assault, gastrointestinal and genitourinary symptoms, sleep disruption and nightmares, and sexual disruption
    b. Reorganization phase—wide range of emotions and physical responses with the purpose of reorganizing life after the assault
  4. PTSD occurs in 30–65% of sexual assault survivors—see the section titled “Anxiety” earlier in this chapter for diagnostic criteria

- Physical findings
  1. Physical findings may be minimal or not apparent until a day or more after the assault
  2. Lacerations, ecchymosis, abrasions, erythema, edema in areas of assault
  3. Colposcopic examination may be used to assist in evaluation

- Differential diagnosis
  1. Accidental injuries
  2. Violence—nonsexual

- Diagnostic tests/findings
  1. Forensic evidence collection technique and requirements may vary from state to state—most states supply evidence collection kits that contain instructions and collection materials
  2. Sexually transmitted infection (STI) and HIV testing is not recommended as part of routine care of sexual assault survivor

- Management/treatment
  1. Comprehensive care for sexual assault victim is often provided by a multidisciplinary team that includes a sexual assault nurse examiner (SANE), victims’ advocate, and law enforcement
  2. Triage and immediate treatment of any life-threatening injuries
  3. Attention to emotional needs of the victim
  4. Collection of evidence per state and agency protocol
  5. Prophylactic treatment for STIs—chlamydia, gonorrhea, trichomoniasis
  6. Initiate hepatitis B vaccination series if patient has not had previously
  7. Prophylactic treatment for HIV—decision based on risk as a result of type of sexual contact, vaginal lacerations, multiple assailants, HIV prevalence in geographic area
  8. Offer emergency contraception if pregnancy is a concern
  9. Discuss need for chlamydia and gonorrhea testing in one to two weeks if not treated prophylactically, along with testing for HIV and syphilis at six weeks, three months, and six months

- Referrals
  a. Legal and social service referrals
  b. Counseling for survivor and family

- Eating Disorders
  - Definitions
    1. Anorexia nervosa—*DSM-5* criteria for diagnosis include
      a. Restriction of intake relative to requirements leading to significantly low body weight in context of age, gender, and physical health
      b. Intense fear of gaining weight and/or persistent behavior that interferes with weight gain, even though the patient is at a significantly low body weight
      c. Disturbed body image
    2. Bulimia nervosa—*DSM-5* criteria for diagnosis include
      a. Recurrent episodes of binge eating
      b. Recurrent, inappropriate compensatory behavior to prevent weight gain (self-induced vomiting; misuse of laxatives, diuretics or enemas; strict dieting or fasting; excessive exercise)
      c. Binge eating and inappropriate compensatory behaviors occur on the average at least twice a week for at least three months
      d. Persistent and exaggerated concern with body shape and weight
  - Etiology/incidence/prevalence/risk factors
    1. Anorexia nervosa
      a. Etiology—biologic, psychological, social, and family factors
      b. About 1% of female adolescents have anorexia
      c. Age of onset—early to late adolescence
      d. Ten to twenty percent mortality due to cardiac arrest or suicide
Risk factors include
(1) Female gender
(2) Parent or sibling with eating disorder
(3) Career choice or aspiration that stresses thinness, perfection, or self-discipline
(4) A difficult transition or loss (leaving home for college, breakup of an important relationship)

2. Bulimia nervosa
   a. Etiology—biologic, psychological, social, and family factors
   b. Age of onset—late adolescence to early adulthood
   c. Occurs in 4% of college-age women
   d. Mortality rate lower than with anorexia nervosa
   e. Thirty to eighty percent of bulimics have history of anorexia nervosa

• Symptoms
  1. Anorexia nervosa—fatigue, cold intolerance, muscle weakness and cramps, dizziness, fainting spells, bloating, amenorrhea, social isolation, excessive concerns about weight, compulsive exercising, odd food rituals, depression
  2. Bulimia nervosa—menstrual irregularities; depression; anxiety; impulsive behaviors (shoplifting, alcohol or drug abuse, unsafe sexual behaviors); lack of meaningful relationships; excessive concerns about weight; requests for diet pills, diuretics, or laxatives

• Physical findings
  1. Anorexia nervosa—emaciation, dry skin, fine body hair (lanugo), muscle wasting, peripheral edema, bradycardia, arrhythmias, hypotension, delayed sexual maturation, stress fractures
  2. Bulimia—erosion of tooth enamel, calluses on dorsal surface of hands from inducing vomiting, swollen parotid glands, cardiac arrhythmias if syrup of ipecac used

• Differential diagnosis
  1. Gastrointestinal disorders
  2. Malignancies
  3. Depression
  4. Other psychiatric disorders

• Diagnostic tests/findings
  1. Anorexia—mild anemia; elevated BUN, cholesterol, and LFTs; electrolyte imbalance; low serum estrogen; abnormal ECG
  2. Bulimia—electrolyte imbalance, abnormal ECG
  3. Rating instruments—Eating Attitudes Test, Eating Disorders Inventory, Body Shape Questionnaire

• Management/treatment
  1. Outpatient treatment—individual/group/family therapy, nutritional counseling, treatment of any medical complications, treatment of any associated mood disorders
  2. Pharmacologic—SSRI fluoxetine approved for treatment of bulimia
  3. Hospitalization is indicated if any of the following apply
     a. Weight is less than 75% of ideal body weight
     b. Client is suicidal
     c. Rapid, persistent decline in oral intake or weight despite intensive outpatient interventions
     d. Electrolyte or metabolic abnormalities, hematemesis, orthostatic hypotension, heart rate < 40 beats per minute (bpm) or > 110 bpm, inability to sustain core body temperature

4. Pregnancy considerations—individuals with anorexia nervosa may have fertility problems; pregnant individuals with eating disorders require special nutritional management to ensure adequate weight gain and nutrient intake

Substance Use Disorders (SUDs)

• Definition
  1. Substance use—use of any psychoactive substance that has a pharmacologic effect on the brain or central nervous system
  2. Psychoactive substance classifications and examples
     a. Stimulants—for example, cocaine, amphetamines, caffeine, nicotine
     b. Depressants or sedative hypnotics—for example, alcohol, barbiturates, benzodiazepines
     c. Narcotics—for example, heroin, opioid medications
     d. Hallucinogens—for example, LSD, PCP, ecstasy
     e. Cannibas—for example, marijuana, hashish
     f. Inhalants—for example, nitrous oxide, hydrocarbons
  3. Potential for harm includes physical injury; body organ pathology; increased risk for cancer; transmission of communicable disease; negative social, legal, psychological consequences
  4. SUD occurs across a continuum, taking into account severity, evidence of physiologic dependence, and course of treatment
  5. Physiologic dependence is defined as evidence of tolerance or withdrawal
  6. Severity of SUD is based on the presence of a number of the 11 DSM-5 criteria
     a. Two to three criteria—mild disorder
     b. Four to five criteria—moderate disorder
     c. Six or more criteria—severe disorder
  7. SUD—DSM-5 criteria
     a. Repeatedly unable to carry out major obligations at work, school, or home due to substance use
     b. Recurrent use of substance in physically hazardous situations
     c. Continued use despite persistent or recurrent social or interpersonal problems caused or made worse by substance use
     d. Tolerance—either a need for markedly increased amounts to achieve intoxication or desired effect or markedly diminished effect with continued use of same amount
     e. Withdrawal—either characteristic syndrome or use of substance to avoid withdrawal
     f. Using greater amounts or over longer time period then intended
     g. Persistent desire or unsuccessful attempts to cut down or control substance use
     h. Spending a lot of time obtaining, using, or recovering from using substances
     i. Stopping or reducing important social, occupational, or recreational activities due to substance use
     j. Consistent use of substances despite acknowledgment of persistent or recurrent physical or psychological difficulties from using substance
     k. Craving or strong desire to use substance
• Etiology/incidence
  1. Complex interplay of neurobiology, genetics, and psychosocial factors involved in SUD
  2. 15.7% of females aged 12 or older report heavy episodic/binge alcohol drinking
  3. One-third of women aged 18 to 25, and 14% of those aged 12 to 20 report heavy episodic/binge alcohol drinking
  4. 8.5% of pregnant women report alcohol use during the pregnancy
  5. Prenatal alcohol exposure is the number one preventable cause of birth defects and intellectual and developmental disabilities in children.
  6. 6.8% of women report illicit drug use; 5.9% of pregnant women reported illicit drug use
  7. Opioid use disorder (OUD) is epidemic in the United States; over 2 million individuals abuse or are dependent on opioids, including both prescription opioid pain relievers (OPRs) and heroin (Boscarino et al., 2010)
  8. Every three minutes, a woman goes to the emergency department for reasons related to prescription OPR misuse or abuse (Centers for Disease Control and Prevention, 2013)
  9. There is evidence that women may progress to dependence on OPRs at a more accelerated rate than men (Substance Abuse and Mental Health Services Administration, 2015)
  10. For women, OPRs are involved in seven out of ten prescription drug deaths; intentional OPR overdoses are involved in one in ten suicides among women (Centers for Disease Control and Prevention, 2013)
• Symptoms
  1. Variable—depends on substance, amount, length of time used, and if going through withdrawal; refer to DSM-5 criteria
  2. Screen all adolescents and adults at least annually for substance use; screen all pregnant women early in pregnancy and repeat as indicated
  3. Use of validated tools help to identify those who are engaged in at-risk substance use and those with a probable SUD
  4. Examples of screening tools
    a. National Institute on Drug Abuse (NIDA) Quick Screen
       (1) In the past year, how many times have you used alcohol, tobacco products, prescription medication for nonmedical reasons, or illegal drugs? Ask about each substance separately
       (2) If answer indicates possible at risk with use of substance, proceed with further screening with another validated tool
    b. NIDA Modified ASSIST (seven items)—not gender specific; covers alcohol, nonmedical use of prescription drugs, illicit drugs, tobacco; asks about frequency and pattern; asks questions specific to psychosocial and physical symptoms
    c. CAGE-C (seven items)—not gender specific; focuses on alcohol use; asks about frequency, pattern, and quantity of use; asks questions specific to psychosocial and physical symptoms
    d. AUDIT (10 items)—not gender specific; focuses on alcohol use; asks about frequency, pattern, and quantity of use; asks questions specific to psychosocial and physical symptoms
• Physical findings with SUD
  1. May not be any apparent physical findings, and they may be variable depending on substance, amount, length of time used, if going through withdrawal from the substance
  2. General—poor nutritional status, poor personal hygiene
  3. Mental status—memory loss, agitation, delirium tremors, hallucinations
  4. Behavior—slurred speech, staggering gait, scratching, violent or bizarre behavior
  5. Mood—depression, anxiety, mood lability, euphoria
  6. Skin—signs of physical injury, needle marks, skin abscesses, cellulitis, jaundice, diaphoresis
  7. HEENT—conjunctival injection, pupil constriction or dilation, inflamed nasal mucosa, rhinorrhea, dental caries, gingivitis
  8. Cardiac—chest pain, increased blood pressure, tachycardia, arrhythmias
  9. Abdominal—enlarged liver, ascites
• Diagnostic test/findings
  1. Blood alcohol level—may be elevated
  2. Gamma glutamyl transferase (GTT)—elevated with heavy or chronic alcohol use
  3. Urine toxicology tests—may be positive for specific substance
  4. Consider other laboratory or diagnostic tests based on risk factors and clinical presentation
• Differential diagnosis
  1. Psychiatric disorders that could account for symptoms and physical exam findings—for example, depression, anxiety disorders, schizophrenia
  2. Medical conditions that could account for symptoms and physical exam findings—for example, endocrinopathies, seizure disorders, head trauma
• Management/treatment
  1. Follow federal and state laws regarding protection of confidentiality for persons receiving alcohol and drug use disorder treatment services and treatment of minors for alcohol and drug use disorder without parental consent
  2. Nonpharmacologic
    a. Brief intervention—if screening reveals at-risk substance use, engage the patient in brief motivation-enhancing intervention to reduce or stop the substance use
    b. Further assessment and treatment if patient is not able to moderate the risky behavior on her own
  3. Pharmacologic
    a. Medications to assist in cessation of alcohol use
       (1) Naltrexone—long-acting opioid agonist; alcohol craving is reduced in about one-half of patients
       (2) Disulfiram—alcohol antagonist; creates a toxic response when patient consumes alcohol
       (3) Acamprosate—antagonizes glutamate receptors; restores chemical balance between excitatory and inhibitory neurotransmitters; prescribed to help in maintaining alcohol abstinence
b. Medication assisted treatment (MAT)—use of medications along with counseling and behavioral therapies to treat OUD and to prevent opioid overdose (Substance Abuse and Mental Health Services Administration, 2015)
(1) Proven to be clinically effective
(2) Multidisciplinary, recovery-oriented treatment approach
(3) Improves birth outcomes among pregnant women with OUD
(4) Medications for MAT
   (a) Buprenorphine—partial opioid receptor agonist; lower potential for abuse and less risk of overdose or respiratory depression than methadone; used for MAT during pregnancy and breastfeeding; neonate may need treatment for neonatal abstinence syndrome
   (b) Methadone—long-acting, full opioid agonist; used for MAT during pregnancy and breastfeeding; neonate may need treatment for neonatal abstinence syndrome
   (c) Naltrexone—long-acting opioid agonist; not used for detoxification; may be used to help prevent relapse

• Referrals
1. SUD inpatient or outpatient counseling and treatment
2. Collaboration with maternal-fetal health specialists if patient is pregnant and has SUD
3. Support groups—Alcoholics Anonymous, Narcotics Anonymous, Smart Recovery
4. Family involvement/support—counseling, Al-Anon, Ala-Teen, Nar-Anon

Questions

Select the best answer.

1. A systolic heart murmur present in an asymptomatic pregnant woman is likely:
   a. due to valvular disease.
   b. associated with history of rheumatic fever.
   c. a physiologic (innocent) murmur.
   d. to intensify with Valsalva maneuver.

2. Which of the following, if left untreated, may progress to squamous cell carcinoma?
   a. Keratosis pilaris
   b. Seborrheic keratosis
   c. Actinic keratosis
   d. Lichen planus

3. Which of the following is not a finding in asthma?
   a. Shortened expiratory phase
   b. Wheezing
   c. Tachypnea and/or dyspnea
   d. Diminished lung sounds

4. Which of the following is consistent with a diagnosis of mild persistent asthma?
   a. Symptoms fewer than twice a week
   b. Daily symptoms
   c. Symptoms cause mild interference with normal activities
   d. Nocturnal symptoms less than twice per month

5. Approximately what percentage of tuberculosis infections cause active disease?
   a. 75%
   b. 60%
   c. 30%
   d. 10%

6. Which of the following is considered a positive PPD reaction?
   a. A 35-year-old healthy individual with a tuberculin reaction of 5 mm who has been in close contact with a TB-infected person
   b. A 45-year-old individual who was recently released from one year of incarceration with a tuberculin reaction of 5 mm
   c. A 28-year-old individual who has no risk factors with a tuberculin reaction of 10 mm
   d. A 40-year-old individual with a tuberculin reaction of 5 mm and who has recently immigrated from a country with high TB prevalence

7. Which of the following is not an anticipated symptom of active TB infection?
   a. Tachycardia
   b. Chest pain
   c. Weight loss
   d. Night sweats

8. A 29-year-old female with migraine headaches receives subcutaneous (SC) sumatriptan for the first time. After the injection she experiences tightness of the throat and chest, flushing, and dizziness. You recognize that these symptoms represent a(n):
   a. allergic reaction to the medication.
   b. anxiety attack related to her headache.
   c. contraindication to SC administration of the medication.
   d. side effect that usually abates in a few minutes.

9. Referral for neurologic evaluation of headaches is indicated when:
   a. new headaches occur in an individual older than 50.
   b. there is a family history of stroke.
   c. focal neurologic deficits precede headache episodes.
   d. migraine headache lasts more than 12 hours.

10. Important nonpharmacologic treatments for acute low back pain do not include:
    a. continuation of daily activities.
    b. heat application.
    c. strength-building exercises.
    d. bed rest.

11. Osteoarthritis may be distinguished from rheumatoid arthritis by:
    a. asymmetry of joint involvement.
    b. erythema of affected joints.
    c. constant pain not affected by rest.
    d. presence of systemic symptoms.

12. RICE therapy refers to a:
    a. nonpharmacologic therapy plan for muscle injuries.
    b. bland diet therapy for nausea and vomiting.
    c. weight loss plan.
    d. combination therapy for peptic ulcer disease.

13. A 46-year-old female presents with complaints of worsening low back pain after lifting a heavy object the previous day. She has a history of intermittent low back pain in the last year, but she notes the pain is now radiating down her right leg. No complaints of trouble
21. Diagnosis of SLE is made by:
   a. abnormal antinuclear antibodies (ANA) titer.
   b. presence of at least four combined signs, symptoms, and laboratory findings.
   c. presence of a specific hematologic disorder on a single occasion.
   d. identification of an immunologic disorder such as abnormal anti-DNA.

22. Systemic lupus erythematosus is usually characterized by:
   a. periods of exacerbation and remission.
   b. slow, steady disease progression.
   c. initial symptoms of typical skin eruptions.
   d. remission in pregnancy.

23. Which of the following is not suspected in the etiology of rheumatoid arthritis?
   a. Autoimmune component
   b. Environmental factors as triggers
   c. Genetic predisposition
   d. Joint trauma

24. The World Health Organization standard for anemia diagnosis in nonpregnant women is hemoglobin less than:
   a. 10 g/dL.
   b. 11 g/dL.
   c. 12 g/dL.
   d. 13 g/dL.

25. Otitis media is suspected when deep ear pain develops concurrent with or following:
   a. airplane travel.
   b. an asthma attack.
   c. an upper respiratory infection.
   d. persistent headache.

26. A patient presents with moderate scratchy sensation in her right eye and a watery discharge that started about 24 hours ago. She states she is just getting over a cold. Appropriate treatment would include:
   a. antibiotics.
   b. comfort measures only.
   c. mast cell stabilizer.
   d. topical antihistamine.

27. Antibiotic treatment should be initiated for the patient with sinusitis who has:
   a. increased pain when he or she bends over or with sudden head movement.
   b. symptoms present 10 or more days without clinical improvement.
   c. symptoms that started within the first week of onset of an upper respiratory infection.
   d. yellow to green nasal discharge.

28. A 21-year-old female presents with symptoms suggestive of infectious mononucleosis. Which of the following does not support the diagnosis?
   a. Pharyngitis
   b. Positive monospot/heterophile antibody test
   c. CBC with atypical lymphocytes
   d. Cough

29. Those most often affected by infectious mononucleosis are:
   a. prepubertal children.
   b. women of reproductive age.
   c. females at any age.
   d. people in their teens to early twenties.
30. The most common reason for painless rectal bleeding with defecation is:
   a. external hemorrhoids.
   b. internal hemorrhoids.
   c. rectal polyps.
   d. colorectal cancer.

31. A 21-year-old female complains of intermittent abdominal pain, bloating, and loose stools three to four times a month for the past three months. Which of the following additional information would lead you toward a diagnosis of irritable bowel syndrome?
   a. Abdominal pain is relieved with defecation.
   b. Antacids relieve the pain.
   c. She is awakened at night by the need to defecate.
   d. She has noted a small amount of bright red blood in the loose stools.

32. For the client described in question 31, initial management of symptoms may include:
   a. alosetron.
   b. fiber supplements.
   c. lubiprostone.
   d. trial of elimination of dairy products.

33. African American women are at increased risk for:
   a. systemic lupus erythematosus.
   b. skin cancer.
   c. iron-deficiency anemia.
   d. tinea corporis.

34. Appendicitis typically presents with which of the following?
   a. High fever as the initial symptom
   b. Pain beginning in the right-lower quadrant (RLQ)
   c. Diarrhea as the initial symptom
   d. Pain in the periumbilical area followed by localization to the RLQ

35. Peptic ulcer disease associated with presence of H. pylori can be diagnosed by:
   a. visualization of H. pylori on Gram-stained preparation.
   b. negative urea breath analysis.
   c. negative urease assay via endoscopy.
   d. serology positive for H. pylori antibodies.

36. A 42-year-old woman had a diagnosis of acute hepatitis B virus (HBV) infection six months ago. Expected laboratory test results, if the infection is resolved and she is now immune to HBV infection, include a positive:
   a. HBV DNA test.
   b. HBV e antigen test.
   c. HBV surface antibody test.
   d. HBV surface antigen test.

37. The primary goal of pharmacologic therapy for acute viral hepatitis B is:
   a. prevention of secondary infection.
   b. relief of symptoms.
   c. reduction of infectivity.
   d. prevention of complications.

38. Most gallstones are composed of:
   a. precipitated bile salts.
   b. precipitated calcium salts.
   c. cholesterol.
   d. pigments.

39. A 45-year-old female presents with right-upper quadrant (RUQ) pain that radiates to the right infrascapular area. The pain is described as colicky and was precipitated by eating pizza. Onset of the symptom was a few hours ago, and the pain is beginning to ease. There was associated nausea and vomiting. The initial study of choice in this patient is:
   a. plain abdominal radiograph.
   b. ultrasound.
   c. computerized tomography (CT).
   d. percutaneous transhepatic cholangiogram.

40. Among the following causes of viral hepatitis, which is most likely to lead to chronic infection and is the most common reason for liver transplantation?
   a. Hepatitis A
   b. Hepatitis B
   c. Hepatitis C
   d. Hepatitis D

41. Patients with acute cholecystitis should be advised:
   a. to undertake strict weight reduction diets if they are obese to prevent recurrences.
   b. that recurrences are uncommon except in the elderly.
   c. that hospital admission and cholecystectomy are the recommended treatment.
   d. that lithotripsy is a highly successful treatment done in the outpatient setting.

42. A 35-year-old overweight female presents with intermittent heartburn for several months. The use of Tums antacid provides temporary relief. During the past week, she has been awakened during the night with a burning sensation in her chest. She is not taking any other medications and has no major health problems. What additional information would support a diagnosis of gastroesophageal reflux disease (GERD) as the cause of her symptoms?
   a. She has occasional nausea and vomiting.
   b. She often notes coughing during the night and a bad taste in her mouth.
   c. The pain is usually relieved by eating.
   d. Constipation has been a chronic problem and she uses laxatives twice a week.

43. Your patient in question 42 denies weight loss; dysphagia; and dark, tarry stools. What is your next step?
   a. Order an endoscopic exam.
   b. Start her on H₂ receptor blockers.
   c. Tell her to eat a snack before bedtime.
   d. Refer her to a gastroenterologist.

44. Assuming a diagnosis of GERD for the patient in questions 42 and 43, you would advise that:
   a. she probably has a hiatal hernia causing the reflux.
   b. she will likely require surgery.
   c. she should avoid dairy products.
   d. high-fat foods and chocolate may aggravate the problem.

45. The laboratory diagnosis of diabetes mellitus can be determined by:
   a. fasting plasma glucose ≥ 126 mg/dL.
   b. a two-hour postprandial glucose ≥ 126 mg/dL.
   c. HbA₁c ≥ 5.5%.
   d. random glucose ≥ 150 mg/dL.

46. A 26-year-old female presents with complaint of watery diarrhea and abdominal cramping for the past two days that started a few days after she returned from a trip to Mexico. She has not noted any blood in her stools and has no fever. Her physical examination reveals
An 18-year-old presents with open and closed comedones without inflammation. The most appropriate first-line treatment would be:

a. topical antibiotics.
b. oral tetracycline.
c. retinoin cream (Retin-A).
d. isotretinoin (Accutane).

The most common form of skin cancer is:

a. squamous cell.
b. basal cell.
c. malignant melanoma.
d. basal cell nevus syndrome.

A 60-year-old presents with a pearly, translucent smooth papule with rolled edges and surface telangiectasias on her forehead. She notes that it has been there for at least a year but has recently increased in size. The lesion most likely represents which of the following?

a. Squamous cell carcinoma
b. Basal cell carcinoma
c. Seborrheic keratosis
d. Malignant melanoma

Education for the woman with systemic lupus erythematosus (SLE) should include which of the following?

a. She should not use hormonal contraception.
b. She should receive annual live attenuated influenza vaccine.
c. If she becomes pregnant, a C-section will be planned to avoid stress of labor.
d. She should use sunscreen and protective clothing when outdoors.

Which of the following is not a risk factor for malignant melanoma?

a. Hispanic ethnicity
b. Multiple pigmented nevi
c. Severe childhood sunburn
d. Family history

A 20-year-old female presents with two anular lesions with a scaly border and central clearing on her trunk. The lesions have been present for one week and are mildly pruritic. What is the most likely diagnosis?

a. Psoriasis
b. Pityriasis rosea
c. Scabies
d. Tinea corporis

A 20-year-old female presents with complaint of itching, and red eye with a sticky, yellow discharge that started in one eye yesterday afternoon and this morning is in both eyes. She states no fever or other symptoms. The most likely diagnosis is:

a. allergic conjunctivitis.
b. bacterial conjunctivitis.
c. chemical exposure conjunctivitis.
d. viral conjunctivitis.

All of the following are known teratogens except:

a. alcohol.
b. methotrexate.
c. opioids.
d. statins.

A 28-year-old female presents with complaints of low back pain after helping a friend move two days ago. She denies any radiation of the pain, numbness, or tingling in the lower extremities or problems with elimination. On physical exam, mild paravertebral muscle spasm is noted with decreased range of motion of the spine. There
are no focal neurologic findings. Appropriate management would include:
   a. radiograph of the lumbosacral spine.
   b. bed rest for three to four days.
   c. NSAIDs.
   d. referral to neurologist.

64. The frequency of sickle cell crises may be reduced by:
   a. activity restrictions.
   b. oxygen therapy.
   c. aggressive treatment of infections.
   d. high-protein diet.

65. Which of the following is an expected finding in tinea unguium?
   a. Hair loss in affected areas
   b. Negative KOH slide preparation
   c. Yellowish, thickened nails
   d. Crusted ulcerations

66. Approximately 10% of those infected with hepatitis B virus become chronic carriers of the disease, a state putting them at risk for:
   a. hepatocellular carcinoma.
   b. mononucleosis.
   c. gallbladder disease.
   d. chronic immunocompromised status.

67. Your patient's blood work returns with a positive hepatitis B surface antigen (HbsAg), which suggests:
   a. chronic liver disease.
   b. previous infection with hepatitis B virus.
   c. acute or chronic infection with hepatitis B virus.
   d. recent vaccination.

68. General principles of drug therapy for hypertension include setting blood pressure goals and initial blood pressure–lowering medication based on all of the following except:
   a. age.
   b. chronic kidney disease.
   c. diabetes.
   d. obesity.

69. Management of constipation should include:
   a. routine use of stool softeners.
   b. bulk-forming agents for acute constipation.
   c. hyperosmolar laxatives (sorbitol) as initial treatment for chronic constipation.
   d. saline laxatives (milk of magnesia) for acute constipation.

70. Using the CURB-65 criteria, a 65-year-old female with community-acquired pneumonia should be hospitalized if she develops which of the following?
   a. Blood pressure greater than 140/90
   b. Confusion or disorientation
   c. Dyspnea on exertion
   d. Pleuritic chest pain

71. Appropriate initial management for an otherwise healthy 52-year-old female with viral community-acquired pneumonia would include:
   a. comfort measures with antibiotics if symptoms persist more than five days.
   b. ordering a sputum culture before any antibiotic treatment.
   c. treatment with azithromycin.
   d. treatment with levofloxacin.

72. Which of the following most likely suggests a secondary cause of hypertension?
   a. BMI greater than 30
   b. Abdominal bruit
   c. Total cholesterol greater than 280
   d. Enlarged spleen

73. Choices of initial antihypertension medication for a 45-year-old African American female with hypertension but otherwise healthy may include:
   a. angiotensin-converting enzyme (ACE) inhibitor.
   b. angiotensin II receptor blockers (ARBs).
   c. calcium channel blocker (CCB).
   d. potassium-sparing diuretic.

74. A 21-year-old comes to the clinic with complaint of amenorrhea. She also complains of feeling cold all the time. Physical examination reveals an underweight female with heart rate of 58 beats per minute and blood pressure 96/52 mm Hg. Pregnancy test is negative. Which of the following additional findings would contribute to a diagnosis of anorexia nervosa?
   a. Currently on probation for shoplifting
   b. Fine body hair on extremities
   c. Migraine headaches
   d. Swollen parotid glands

75. Common physical findings with allergic rhinitis include:
   a. facial tenderness.
   b. inflamed nasal mucosa.
   c. nasal crease.
   d. purulent nasal discharge.

76. The recommended initial test for deep vein thrombosis (DVT) in a symptomatic patient is:
   a. plasma D-dimer.
   b. contrast venography.
   c. antithrombin III.
   d. duplex ultrasound.

77. Which of the following is not a recommended treatment for superficial thromboembolitis?
   a. Compression with an ace wrap
   b. Elevation of affected limb
   c. Heparin
   d. Nonsteroidal anti-inflammatory drugs (NSAIDs)

78. The most likely diagnosis for physical examination findings that include presence of lesions located on the elbows, knees, and scalp that have well-defined borders, an erythematous base, and silvery scales is:
   a. contact dermatitis.
   b. psoriasis.
   c. scabies.
   d. seborrheic keratosis.

79. A 44-year-old female presents with type 2 diabetes and hyperlipidemia. Which of the following should be your main treatment goal?
   a. HDL > 40 mg/dL
   b. LDL cholesterol < 100 mg/dL
   c. Total cholesterol < 200 mg/dL
   d. Triglycerides < 250 mg/dL

80. A 50-year-old female patient presents with complaint of severe pain that started in her upper midabdomen that now is worse in the right-upper quadrant (RUQ) of her abdomen. She has also had nausea and vomiting. On deep palpation of her RUQ, she momentarily holds her breath on inspiration. You suspect:
   a. appendicitis.
   b. acute cholecystitis.
   c. pancreatitis.
   d. peptic ulcer disease.
81. A microcytic anemia with a low serum ferritin is likely secondary to:
   a. anemia of chronic disease.
   b. iron deficiency.
   c. hypersplenism.
   d. thalassemia minor.

82. For which population with hypertension is the blood pressure goal less than 150/90 rather than 140/90?
   a. African Americans of any age without diabetes or chronic kidney disease
   b. General population at all ages with diabetes or chronic kidney disease present
   c. General population age 60 years or older without diabetes or chronic kidney disease
   d. General population younger than 60 years without diabetes or chronic kidney disease

83. Fibromyalgia most commonly presents with which of the following signs and symptoms?
   a. Abrupt onset of proximal muscle weakness
   b. Widespread musculoskeletal pain and tender points
   c. Effusion of involved joints with mild local warmth
   d. Subcutaneous nodules

84. Long-term use of corticosteroids may be a secondary cause for:
   a. asthma.
   b. dyslipidemia.
   c. iron-deficiency anemia.
   d. osteoarthritis.

85. A systolic click preceding a mid to late systolic murmur is most likely caused by which of the following?
   a. Aortic stenosis
   b. Mitral valve prolapse
   c. Mitral valve stenosis
   d. Idiopathic hypertrophic subaortic stenosis

86. Which of the following is not a common finding with an innocent murmur?
   a. Heard best with patient supine
   b. Increases with increased cardiac output
   c. Increases with Valsalva maneuver
   d. Most frequently heard during systole

87. The leading killer of women in the United States is:
   a. coronary heart disease.
   b. lung cancer.
   c. ovarian cancer.
   d. violence.

88. Virchow's triad defines the clinical origin of most venous thrombi and includes all of the following factors except:
   a. stasis.
   b. endothelial damage.
   c. deposition of cholesterol plaques.
   d. hypercoagulability.

89. A patient presents with signs and symptoms suggestive of a superficial phlebitis. Physical findings in this patient would include:
   a. tenderness in the area of the involved vein.
   b. edema of the involved extremity.
   c. pale, cool skin in the area of involved vein.
   d. palpable venous cord.

90. In the United States, the most common cause of community-acquired bacterial pneumonia is:
   a. Streptococcus pneumoniae.
   b. Streptococcus pyogenes.
   c. Haemophilus influenzae.
   d. Legionella pneumophila.

91. A 24-year-old female with asthma classified as mild persistent is considering pregnancy. She currently uses an albuterol metered-dose inhaler and the inhaled corticosteroid budesonide. Advice concerning her asthma and pregnancy should include which of the following?
   a. Exacerbations during pregnancy are common but will not harm the fetus/infant.
   b. It is safer to be treated for asthma during pregnancy than to have symptoms and exacerbations.
   c. Oral corticosteroids should be initiated prior to conception so that asthma is well controlled in early pregnancy.
   d. The medications she is currently using are contraindicated during pregnancy.

92. American College of Rheumatology (2010) classification criteria for a diagnosis of rheumatoid arthritis include:
   a. fever.
   b. elevated erythrocyte sedimentation rate.
   c. joint erosion on radiography.
   d. symmetrical joint involvement.

93. Your patient is experiencing three to four migraine headaches per month. You decide to begin prophylactic medication. Which of the following is recommended for migraine headache prophylaxis?
   a. Ergotamine
   b. Propranolol (beta blocker)
   c. Sumatriptan
   d. An SSRI

94. Which of the following is true concerning the treatment of rheumatoid arthritis (RA)?
   a. NSAIDs and corticosteroids are important for long-term management.
   b. The main mechanism of action of disease-modifying antirheumatic drugs (DMARDs) is analgesia.
   c. DMARDs and immunomodulating biologic agents may be combined if monotherapy is not effective.
   d. Methotrexate is the preferred DMARD for use by pregnant women with RA.

95. Metabolic syndrome is defined as having at least three of a set of five risk factors. One of these risk factors for women is:
   a. blood pressure 150/90 mm Hg or higher.
   b. HDL-C 40 mg/dL or less.
   c. triglycerides 200 mg/dL or higher.
   d. waist circumference greater than 35 inches.

96. Acute otitis media is characterized by all of the following physical examination findings except:
   a. distorted light reflex.
   b. obscured bony landmarks.
   c. erythema of the ear canal.
   d. postauricular lymphadenopathy.

97. Physical examination and laboratory test findings expected with a diagnosis of infectious mononucleosis include:
   a. elevated basophils and eosinophils.
   b. erythematous rash in groin and axillary areas.
   c. purulent nasal discharge.
   d. tonsillar enlargement with exudate.
98. Potential causes of a seizure include:
   a. syncope.
   b. hyperventilation.
   c. narcolepsy.
   d. metabolic disorders.

99. The most common type of seizure disorder in adults is:
   a. clonic-tonic.
   b. partial.
   c. complex partial.
   d. grand mal.

100. Macrocytic anemias include:
     a. anemia of chronic disease.
     b. vitamin B₁₂-deficiency anemia.
     c. iron-deficiency anemia.
     d. sickle cell anemia.

101. A 52-year-old menopausal female had a deep vein thrombosis in her leg two years ago. She has a BMD T-score of −1.75. Which of the following medications would be the most appropriate for this client to prevent osteoporosis?
   a. Alendronate
   b. Calcitonin
   c. Estrogen
   d. Raloxifene

102. Which of the following statements is correct concerning bone mineral density (BMD) testing?
   a. Test results are most predictive of bone fracture when done on an annual basis.
   b. The T-score compares BMD of the client with an age-matched normal adult.
   c. BMD T-scores should be combined with bone X-ray to confirm osteoporosis.
   d. Treatment decisions based on T-scores may vary according to risk factors.

103. For which of the following women would vertebral fracture assessment (VFA) with vertebral imaging be most appropriate?
   a. Forty-year-old woman with history of low trauma fracture during adulthood
   b. Forty-year-old woman on long-term glucocorticoid treatment
   c. Sixty-year-old woman with measured height loss of 2 centimeters or more
   d. Sixty-year-old woman with BMD T-score at or below 1.5

104. Client instructions for taking alendronate should include which of the following?
   a. Take medication with breakfast.
   b. Take medication at bedtime.
   c. Take medication on an empty stomach.
   d. Take medication with an antacid.

105. Which of the following is no longer a criterion for a diagnosis of anorexia nervosa according to DSM-5 criteria?
   a. Amenorrhea
   b. Disturbed body image
   c. Intense fear of gaining weight
   d. Significantly low body weight

106. One of the most significant laboratory tests for evaluating an individual for chronic or heavy alcohol use is a(n):
   a. alkaline phosphatase (ALP).
   b. blood urea nitrogen (BUN).
   c. complete blood count (CBC).
   d. gamma glutamyl transferase (GTT).

107. Two months after being raped, a client tells you she cannot concentrate on her schoolwork and is having nightmares about the experience. These symptoms indicate that she:
   a. is still in the acute phase of rape trauma syndrome.
   b. is going through normal reorganization following a rape.
   c. is experiencing post-traumatic stress disorder.
   d. now has a generalized anxiety disorder.

108. A client who has been experiencing fatigue, insomnia, difficulty concentrating, and feelings of worthlessness for the past two weeks would meet the DSM-5 criteria for a major depressive disorder if she also has:
   a. loss of interest in her usual activities.
   b. psychomotor retardation.
   c. psychosomatic complaints.
   d. suicidal ideation.

109. Contraceptive counseling for a 24-year-old female with diabetes who has no complications or other health problems should include which of the following?
   a. Combination hormonal contraceptives are contraindicated.
   b. Progestin-only methods are a better choice than are those containing estrogen.
   c. She can use any of the long-acting reversible contraceptives.
   d. She should complete her childbearing by age 30 and consider sterilization.

110. A 24-year-old female client with major depression tells you that she feels like her life is falling apart with no hope of improving. She recently lost her job, had to move out of her apartment, and now lives with her sister. Her risk factors for a suicide attempt include:
   a. age between 20 and 30 years.
   b. female gender.
   c. current living situation.
   d. sense of hopelessness.

111. A client tells you that she has experienced chest tightness, difficulty breathing, and dizziness whenever she rides on the city bus. She has been trying to find other transportation because she is very fearful about these symptoms recurring. Her symptoms best fit a description of:
   a. acute stress disorder.
   b. panic disorder with agoraphobia.
   c. obsessive-compulsive disorder.
   d. social phobia.

112. The most common type of anxiety disorder is:
   a. generalized anxiety disorder.
   b. specific phobia.
   c. panic disorder.
   d. post-traumatic stress disorder.

113. Which of the following statements concerning bulimia is correct?
   a. Age of onset is usually early adolescence.
   b. Amenorrhea is usually present.
   c. Mortality rate is higher than for anorexia nervosa.
   d. Impulsive behavior is a common characteristic.

114. Major side effects of selective serotonin reuptake inhibitors include which of the following?
   a. Anticholinergic effects
   b. Nausea
   c. Orthostatic hypotension
   d. Urinary retention
115. Which of the following medications is not recommended for ongoing treatment of generalized anxiety?
   a. Alpraxolam (Xanax)
   b. Buspirone (Buspar)
   c. Duloxetine (Cymbalta)
   d. Paroxetine (Paxil)

116. Physiologic dependence on a substance is defined as evidence of withdrawal symptoms and/or:
   a. craving or strong desire to use substance.
   b. inability to carry out major obligations due to the substance use.
   c. markedly increased amounts of the substance needed to achieve intoxication or desired effect.
   d. unsuccessful attempts to cut down on or control substance use.

117. Physical findings that help the clinician make a diagnosis of bulimia would include:
   a. erosion of tooth enamel.
   b. hypotension.
   c. presence of lanugo.
   d. stress fractures.

118. Which of the following statements concerning rape is true?
   a. All of the states have now established the same legal definition for rape.
   b. The majority of rapes are committed by acquaintances of the victim.
   c. The most common emotional response of the victim in the acute phase is anger.
   d. The clinician is responsible for determining whether a rape has actually occurred.

119. Which of the following drugs decreases hepatic glucose production?
   a. Biguanides (metformin)
   b. Insulin
   c. Meglitinides (repaglinide)
   d. Sulfonlureas (glyburide, glipizide)

120. Severe exacerbations in an individual with intermittent (step 1) asthma are appropriately treated with:
   a. mast-cell stabilizers.
   b. short-acting inhaled B2 agonists.
   c. systemic corticosteroids.
   d. theophylline.

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**Answers with Rationales**

1. c. a physiologic (innocent) murmur.
   - Pregnant women may have grade 1 or 2 systolic murmurs due to physiologic increased cardiac output.

2. c. Actinic keratosis
   - Sixty percent of squamous cell carcinomas occur at site of previous actinic keratosis.

3. a. Shortened expiratory phase
   - Physical respiratory findings in asthma include hyperresonance with percussion, wheezing, prolonged expiratory phase, and diminished breath sounds; tachypnea; and dyspnea.

4. c. Symptoms cause mild interference with normal activities
   - Mild persistent asthma is characterized by daytime symptoms greater than two times/week but not daily; nocturnal symptoms three to four times/month; use of short-acting beta-agonist inhaler to manage symptoms more frequent than two days/week, no more than one time a day and not daily; two or more exacerbations requiring oral corticosteroids over last year; mild interference with normal activity; FEV1 greater than 80% predicted (normal FEV1/FVC ratio for age between exacerbations).

5. d. 10%
   - The asymptomatic state (latent TB infection) may last months to years, with 10% developing active TB.

6. a. A 35-year-old healthy individual with a tuberculin reaction of 5 mm who has been in close contact with a TB-infected person
   - A 5-mm or greater skin reaction on PPD test is considered positive in individuals who are HIV positive, immunocompromised, with abnormal chest radiograph findings consistent with healed TB lesions, or in recent close contact with a TB-infected person.

7. a. Tachycardia
   - Individuals with active TB may have generalized symptoms of night sweats, fever, malaise, weakness, anorexia and weight loss, and pulmonary symptoms of productive cough, hemoptysis, chest pain, and dyspnea.

8. d. side effect that usually abates in a few minutes.
   - Sumatriptan is used for abortive treatment of migraine headache and may initially cause tightness of the throat/chest, flushing, numbness, tingling, and dizziness. This is a side effect that typically abates in a few minutes and is not a contraindication for future use.

9. a. new headaches occur in an individual older than 50.
   - Reasons for referral for neurologic evaluation of headaches include a new type of headache occurring in an individual older than 50 years of age, sudden onset of worst headache ever experienced, headaches increasing in severity/frequency, headache initiated by exertion, focal neurological symptoms persisting after headache onset, headache subsequent to head trauma, and any other indicators of a potentially serious secondary cause.

10. d. bed rest.
    - Nonpharmacologic interventions for managing lower back pain include continuation of daily activities rather than bed rest, in addition to local application of heat, warm baths, physical therapy program to improve strength and conditioning, and low-stress aerobic exercise—walking, biking, swimming.

11. a. asymmetry of joint involvement.
    - Symptoms are often asymmetrical with osteoarthritis. Pain is aggravated by joint use and subsides with rest. Physical findings for the affected joints may include decreased range of motion, crepitus with movement, minimal local warmth without erythema, and enlargement of distal and proximal interphalangeal joints.

12. a. nonpharmacologic therapy plan for muscle injuries.
    - RICE is the mnemonic to remember the initial therapeutic strategy for muscle injuries. It stands for:
      - Rest or immobilization of injured part
      - Ice or application of cold
      - Compression, elastic wrap
      - Elevation of affected area
13. d. herniated disc involving the S1 root.
   A herniated disc is characterized by radicular pain; paresthesias may occur in distribution of involved nerve root. Most common disc ruptures involve the L5 or S1 nerve roots. S1 root/L5–S1 disc involves pain in the buttocks, lateral leg, and malleolus and numbness in lateral foot and posterior calf.

14. c. saline gargles.
   Symptomatic relief measures are appropriate for this individual. Rapid streptococcal antigen test is recommended for adult with pharyngitis that meets two or more of the following criteria: fever, lack of cough, tonsillar exudates, tender anterior cervical adenopathy.

15. d. antiretroviral therapy during pregnancy.
   The risk of vertical transmission of the HIV virus from HIV-positive mother to infant may be reduced to less than 1% if mother receives multi-agent antiretroviral therapy and has undetectable viral load at delivery.

16. d. Western blot.
   Confirmatory tests are highly specific for detecting HIV antibodies and are indicated if the individual has a positive HIV screening test. The indirect immunofluorescence assay (Western blot) is a commonly used confirmatory test.

17. c. response to drug therapy is monitored by HIV RNA levels.
   HIV RNA levels are useful for predicting progression of disease by indicating viral load and are used to monitor antiretroviral therapy.

18. d. AIDS
   Pneumocystis (carinii) jiroveci pneumonia (PCP) is an opportunistic infection that rarely occurs in healthy people. Most opportunistic infections occur in HIV-infected individuals with a CD4 count less than 200 cells/mm³. PCP is a major AIDS-defining diagnosis.

19. a. 5 mm.
   A 5-mm or greater skin reaction on PPD test is considered positive in individuals who are HIV positive, immunocompromised, with abnormal chest radiograph findings consistent with healed TB lesions, or in recent close contact with a TB-infected person.

   Risk factors for systemic lupus erythematosus (SLE) include being of African American or Hispanic descent or having a first-degree relative with SLE.

21. b. presence of at least four combined signs, symptoms, and laboratory findings.
   The American College of Rheumatology has set the SLE diagnostic criteria to include the presence of at least four of 11 criteria. Criteria include presence of specific dermatologic symptoms; arthritis; serositis; renal, neurologic, and hematologic conditions; positive ANA test; and other immunologic positive tests.

22. a. periods of exacerbation and remission.
   SLE is a chronic, inflammatory, multisystem disorder of the immune system characterized by periods of remission and exacerbation, with the course of disease unpredictable and highly variable.

23. d. Joint trauma
   The exact etiology of rheumatoid arthritis is unknown, although it is suspected to have an autoimmune component influenced by genetic, environmental, and perhaps hormonal factors.

24. c. 12 g/dL.
   According to the World Health Organization, anemia is defined as < 12 g/dL for women and < 13 g/dL for men.

25. c. an upper respiratory infection.
   Eustachian tube dysfunction secondary to URI (often viral) or allergies causes edema and congestion that impedes flow of middle ear secretions; accumulation of secretions promotes growth of pathogens.

26. b. comfort measures only.
   Viral conjunctivitis usually has an acute onset, mild symptoms in one or both eyes, and a watery discharge. It may be associated with an upper respiratory infection and is self-limited. Cold compresses and liquid tears may offer relief of symptoms.

27. b. symptoms present 10 or more days without clinical improvement.
   Antibiotic treatment for acute sinusitis should be initiated if signs and symptoms are present 10 or more days after onset of upper respiratory symptoms or if symptoms improve and then within 10 days they worsen again.

28. d. Cough
   The classic triad of symptoms for mononucleosis is fever, sore throat, and swollen lymph nodes (particularly the anterior and posterior cervical chain). A monospot/heterophile antibody test will usually be positive within one to two weeks after onset of symptoms. The CBC will show lymphocytic leukocytosis with 10% of cells atypical.

29. d. people in their teens to early twenties.
   Most clinically apparent mononucleosis infections occur in individuals 10 to 30 years old, with a peak rate in ages 15 to 19 years old.

30. b. internal hemorrhoids.
   Internal hemorrhoids originate above the anorectal line, are covered by nonsensitive rectal mucosa, and are usually painless. They may present with bright red bleeding during defecation.

31. a. Abdominal pain is relieved with defecation.
   Abdominal pain and bloating are often relieved at least temporarily with defecation in patients with irritable bowel syndrome (IBS). IBS is not characterized by symptoms that awaken the patient at night or by blood in the stools.

32. d. trial of elimination of dairy products.
   A two-week trial of lactose-free, fructose-free, or sorbitol-free foods (one at a time) may be considered to rule out food intolerance in a patient who has bloating, gas, abdominal distention, and diarrhea. Alosetron should be limited to use in women with severe chronic diarrhea–predominant IBS not responsive to conventional therapy. Lubiprostone and fiber supplements may be appropriate for the patient with constipation–dominant IBS.

33. a. systemic lupus erythematosus.
   The prevalence of SLE is much higher in African American women (1 in 250) and Hispanic women (100 in 100,000) than in Caucasian women (12 to 39 in 100,000).

34. d. Pain in periumbilical area followed by localization to the RLQ.
   Pain is the initial symptom in appendicitis, beginning in the epigas- trum or periumbilical area and localizing to the RLQ after several hours.

35. d. serology positive for H. pylori antibodies.
   A serologic ELISA test detects IgG antibodies, indicating current or past infection with H. pylori. It may or may not revert to negative after treatment. A positive urea breath test indicates presence of active H. pylori infection.
36. c. HBV surface antibody test. A positive HBV surface antibody test indicates resolution of HBV infection and immunity to future infection. The test will also be positive in individuals with immunity as a result of HBV vaccination.

37. b. relief of symptoms. Nonpharmacologic treatment for acute hepatitis B infection includes activity as tolerated, hydration, adequate caloric intake in small feedings, discontinuation of all but essential medications, and avoidance of alcohol. Antiemetics may be indicated for nausea.

38. c. cholesterol. Approximately 85–95% of gallstones are composed primarily of cholesterol.

39. b. ultrasound. This patient's symptoms are consistent with acute cholecystitis. Ultrasound has a 95% sensitivity in detecting stones in the gallbladder. It is the best noninvasive imaging technique to diagnose acute cholecystitis.

40. c. Hepatitis C. Up to 80% of patients with hepatitis C will develop chronic hepatitis; 20–30% eventually develop cirrhosis or hepatocellular carcinoma.

41. c. that hospital admission and cholecystectomy are the recommended treatment. Acute cholecystitis is managed with hospital admission and early cholecystectomy once the patient is stable.

42. b. She often notes coughing during the night and a bad taste in her mouth. Acid regurgitation with GERD is most common when reclining, straining, bending, or stooping. This can cause coughing and a bad taste in the mouth.

43. b. Start her on H2 receptor blockers. GI referral and diagnostic evaluation are needed if symptoms are chronic or refractory to therapy; if esophageal complications are suspected; or if the patient has dysphagia, weight loss, or evidence of GI bleeding. H2 receptor blockers inhibit acid secretion and are effective for less severe GERD.

44. d. high-fat foods and chocolate may aggravate the problem. High-fat foods, chocolate, and peppermint decrease lower esophageal pressure, making reflux more likely.

45. a. fasting plasma glucose ≥ 126 mg/dL. The criteria for diagnosis of diabetes include any of the following: fasting plasma glucose ≥ 126 mg/dL, two-hour postprandial glucose ≥ 200 mg/dL, HbA1c ≥ 6.5%, or random glucose ≥ 200 mg/dL with classic symptoms of hyperglycemia or hyperglycemic crisis.

46. b. instructions to maintain fluid intake and limit the use of antidiarrheal agents. The most common causative agent in traveler's diarrhea is E. coli. If the patient doesn't have bloody stools or a fever, and symptoms are self-limiting, no stool evaluation or antibiotic treatment is needed.

47. d. inhibiting cholesterol absorption. Ezetimibe is a drug considered for use in combination with a moderate-intensity statin for individuals with indications for but who cannot tolerate high-intensity statins. This drug works by inhibiting cholesterol absorption.

48. a. Graves's disease. Graves's disease represents 90% of hyperthyroidism. This is an autoimmune condition with excess synthesis and secretion of thyroid hormone caused by antibodies that stimulate TSH receptors.

49. a. Graves's disease. Hyperthyroidism caused by Graves's disease is characterized by exophthalmos.

50. a. Low serum TSH and elevated free T4. Low TSH is a result of excess circulation of thyroid hormone (T4, T3) with hyperthyroidism.

51. c. High TSH, low free T4. Radioactive iodine treatment for Graves's disease usually results in long-term hypothyroidism—70% of patients at 10 years.

52. d. No change in levothyroxine is indicated at this time. Levothyroxine has a half-life of six days and a slow rate of achieving steady state. Adjust dose every six weeks until TSH normalizes.

53. c. fried foods. Factors that can exacerbate acne include hormonal cycling, use of topical corticosteroids, and contact with irritant oils or cosmetics.

54. c. the necessity for highly effective contraception. Isotretinoin is a known teratogen and is contraindicated for use during pregnancy or if the patient could become pregnant, and it should not be used in pregnancy because of its detrimental effects to the fetus.

55. c. tretinoin cream (Retin-A). Tretinoin cream is an effective comedolytic agent for mild, noninflammatory acne that is applied topically to affected areas.

56. b. basal cell. Basal cell carcinoma is the most common skin cancer, comprising approximately 75% of all skin cancers, and it affects nearly 1 million people per year in the United States.

57. b. Basal cell carcinoma. Basal cell carcinoma has several clinical variants; nodular basal cell is most common. Basal cell carcinoma presents as waxy, semitranslucent nodules with rolled borders that may have central ulcerations and telangiectasias. They are slow-growing lesions.

58. d. She should use sunscreen and protective clothing when outdoors. Photosensitivity is a characteristic of systemic lupus erythematosus. Malar rash and rash on other exposed body parts may occur with sun exposure. Sun exposure may also exacerbate disease activity.

59. a. Hispanic ethnicity. Risk factors for malignant carcinoma include history of changing mole, family and/or personal history of melanoma, history of nonmelanoma skin cancer, atypical nevus syndrome, fair complexion, and tendency to sunburn.

60. d. Tinea corporis. Classic presentation of tinea is a lesion with central clearing surrounded by an advancing, red, scaly, elevated border. If the tinea is found on the body, it is classified as tinea corporis.

61. b. bacterial conjunctivitis. Bacterial conjunctivitis has an acute onset with itchy sensation/discomfort and mucopurulent discharge beginning in one eye and spreading to the other eye.
62. c. opioids.
Alcohol, methotrexate, and statins are known teratogens.

63. c. NSAIDs.
Lower back pain is located in the back, buttocks, or one or both thighs. Pain is usually aggravated by standing/flexion and relieved with rest/reclining. There is increased pain with flexion and negative straight leg raise (SLR) with a normal neurologic exam. A radiograph of the lumbosacral spine or a referral to the neurologist is not necessary at this time. Bed rest is not recommended for treatment of lower back pain. NSAIDs would be an appropriate management for this patient.

64. c. aggressive treatment of infections.
Precipitating factors for vaso-occlusive crises include infection, physical or emotional stress, blood loss, pregnancy, surgery, and high altitudes. Aggressive treatment of infections may prevent a crisis for the patient with sickle cell disease.

65. c. Yellowish, thickened nails.
Tinea unguium is characterized by toenails being more frequently involved than fingernails and nails that are yellowish/thickened.

66. a. hepatocellular carcinoma.
Up to 10% of hepatitis B–infected adults and 90% of those infected as neonates become chronic carriers, with an increased risk of cirrhosis and hepatocellular carcinoma.

67. c. acute or chronic infection with hepatitis B virus.
Positive hepatitis B surface antigen (HBsAg) indicates acute or chronic infection with hepatitis B virus. Positive IgM anti-HBc indicates acute infection and disappears in three to 13 months.

68. d. obesity.
General principles of drug therapy for hypertension include setting blood pressure goals and initiating blood pressure-lowering medication based on age, diabetes, and chronic kidney disease.

69. d. saline laxatives (milk of magnesia) for acute constipation.
Saline laxatives draw water into the intestinal lumen, causing fecal mass to soften and swell; swelling stretches the intestinal lumen and simulates peristalsis.

70. b. Confusion or disorientation.
CURB-65 criteria include confusion, uremia (BUN > 19 mg/dL), respiratory rate greater than 30 breaths per minute, blood pressure < 90 mm Hg systolic or < 60 mm Hg diastolic, and age 65 or older. If an individual meets two or more of the five CURB-65 criteria for community-acquired pneumonia, that individual should be hospitalized for treatment.

71. c. treatment with azithromycin.
Recommended first-line treatment of community-acquired pneumonia, whether viral or bacterial, is empiric antimicrobial therapy with an advanced generation macrolide such as azithromycin. If the patient has risk factors for drug-resistant Streptococcus pneumoniae (DRSP), the recommended antibiotic is a respiratory fluoroquinolone.

72. b. Abdominal bruising.
Secondary hypertension may be the result of renal artery stenosis. An abdominal bruise may indicate renal artery stenosis.

73. c. calcium channel blocker (CCB).
Initial management of hypertension in African Americans of all ages without diabetes or chronic kidney disease is a thiazide-type diuretic or calcium channel blocker (CCB), alone or in combination

74. b. Fine body hair on extremities.
Physical examination findings with anorexia nervosa include emaciation, dry skin, fine body hair (lanugo), muscle wasting, peripheral edema, bradycardia, arrhythmias, hypotension, delayed sexual maturation, and stress fractures.

75. c. nasal crease.
A common physical finding with perennial allergic rhinitis is a horizontal crease along the lower bridge of the nose from the patient pushing the nose upward and backward because of itching and nasal discharge.

76. d. duplex ultrasound.
Duplex ultrasound has good sensitivity and specificity for diagnosis of a patient who has intermediate to high probability of deep vein thrombosis (DVT). A negative test, however, does not rule out DVT in the symptomatic patient, so other follow-up tests are needed.

77. c. Heparin.
Treatment for superficial thrombophlebitis includes elevation of the affected limb, compression with an ace wrap, and nonsteroidal anti-inflammatory drugs (NSAIDs).

78. b. psoriasis.
The characteristic lesions of psoriasis are located on the knees, elbows, and scalp; have well defined borders and an erythematous base; and silvery scales overlaying the lesions.

79. b. LDL cholesterol < 100 mg/dL.
Treatment goals for hyperlipidemia are based on risk factors. Diabetes is considered a coronary heart disease (CHD) risk equivalent. The treatment goal for an individual who has hyperlipidemia and clinically manifested CHD or a CHD risk equivalent is an LDL-C of less than 100 mg/dL.

80. b. acute cholecystitis.
Symptoms of acute cholecystitis include pain that starts in the epigastrium and then moves to the RUQ accompanied with nausea and vomiting. The patient with acute cholecystitis has a stop in inspiratory effort because of the sharp increase in pain (Murphy’s sign) when the RUQ is palpated.

81. b. iron deficiency.
Diagnostic findings for iron-deficiency anemia include hypochromic microcytic RBCs, MCV less than 80 FL, increased red cell width (RDW), a low serum ferritin less than 10 mg/L, and decreased reticulocyte count.

82. c. General population without diabetes or chronic kidney disease age 60 years or older.
The blood pressure goal for individuals with hypertension who do not have diabetes or chronic kidney disease and who are age 60 years or older is less than 150/90. For all other individuals with hypertension who are under 60 years of age, regardless of co-existing diabetes or chronic kidney disease, the blood pressure goal is less than 140/90.

83. b. Widespread musculoskeletal pain and tender points.
Fibromyalgia is a syndrome characterized by chronic fatigue and by generalized, widespread musculoskeletal pain and stiffness associated with the finding of characteristic tender points of pain on physical examination.

84. b. dyslipidemia.
Secondary causes for dyslipidemia include obesity; endocrine and metabolic disorders; obstructive liver disease; renal disorders; and some medications that include corticosteroids, thiazide diuretics, and beta blockers.
85. b. Mitral valve prolapse
   A mid or late systolic click is usually caused by mitral valve prolapse. A late systolic murmur may be present if there is mitral valve regurgitation.

86. c. Increases with Valsalva maneuver
   Innocent murmurs are usually soft (grade 1 or 2), medium-pitch, systolic murmurs. They are heard best with the patient supine and disappear with standing or straining. They increase with increased cardiac output, for example, with pregnancy, exercise, or fever.

87. a. coronary heart disease.
   Coronary heart disease is the cause of death of one out of every three women each year.

88. c. deposition of cholesterol plaques.
   The origin of most venous thrombi lies in Virchow's triad—endothelial damage, stasis, and hypercoagulability.

89. a. Streptococcus pneumoniae.
   The most common cause of bacterial community-acquired pneumonia is Streptococcus pneumoniae.

90. b. It is safer to be treated for asthma during pregnancy than to have symptoms and exacerbations.
   Asthma exacerbations during pregnancy increase the risk for perinatal mortality, preterm birth, and low-birthweight infants. First-line treatment during pregnancy includes the short-acting inhaled B2 agonist albuterol and the inhaled corticosteroid budesonide.

91. b. elevated erythrocyte sedimentation rate.
   The 2010 American College of Rheumatology classification criteria for diagnosis involves a score-based algorithm that includes joint involvement (stiffness, swelling), serology (rheumatoid factor, anti-citrullinated protein antibody), and acute phase reactants (C-reactive protein, erythrocyte sedimentation rate), and duration of symptoms.

92. b. Propanolol (beta blocker)
   For patients who experience more than two severe headaches per month, who need acute treatment medication more than two times per week, or who are unable to tolerate abortive agents, consider prophylactic therapy: beta blockers such as propranolol/timolol, calcium channel blockers, or antiepileptic agents.

93. c. DMARDs and immunomodulating biologic agents may be combined if monotherapy is not effective.
   DMARDs are the preferred therapy for long-term management of rheumatoid arthritis. Immunomodulating biologic agents are commonly used for individuals with RA who have toxicity and/or intolerance, or who cannot find relief with with nonbiologic DMARDs; they may be used as initial therapy for individuals with severe RA, and they may be used in combination with DMARDs.

95. d. waist circumference greater than 35 inches.
   Metabolic syndrome is defined as presence of at least three of five risk factors. For women, these include abdominal obesity/waist circumference greater than 35 inches, triglycerides 150 mg/dL or greater, HDL-C less than 50 mg/dL, blood pressure 130/85 or greater, and fasting glucose 110 mg/dL or greater.

96. c. erythema of the ear canal.
   Common physical examination findings with otitis media include full or bulging tympanic membrane with absent or obscured landmarks, distorted light reflex, and postauricular or cervical lymphadenopathy.

97. d. tonsillar enlargement with exudate.
   Physical examination findings with infectious mononucleosis include tonsillar enlargement with exudate; palatal petechiae at the junction of the hard and soft palates (25% of cases); lymphadenopathy; particularly the posterior cervical chain; fever compatible with severity of infection; hepatomegaly (25%); and splenomegaly (50%). CBC will reveal lymphocytic leukocytosis with atypical lymphocytes common.

98. d. metabolic disorders.
   Seizures may be caused by metabolic disorders such as hypoglycemia, hypocalcemia, acidosis, and alcohol withdrawal.

99. c. Complex partial.
   Complex partial seizures are the most common adult type of seizures. Absence seizures are most common in childhood.

100. b. vitamin B12–deficiency anemia.
    Macrocytic anemia (MCV > 100 fl.) is found in people with vitamin B12 deficiency, folate deficiency, liver disease, and hypothyroidism.

101. a. Alendronate
    Alendronate is indicated for prevention and treatment of osteoporosis. Given the patient's history of DVT, she should not use estrogen therapy or an estrogen agonist/antagonist because of the possible increased risk of a thromboembolic event. Calcitonin is indicated for treatment only and not for prevention.

102. d. Treatment decisions based on T-scores may vary according to risk factors.
    Pharmacologic treatment is considered for postmenopausal women presenting with any of the following: hip or vertebral fracture; T-score of −2.5 or less at the femoral neck or spine after appropriate evaluation to exclude secondary causes; T-score between −1.0 and −2.5 at femoral neck or spine and 10-year probability of hip fracture of 3% or greater; or a 10-year probability of major osteoporotic-related fracture of 20% or greater based on U.S.-adapted WHO algorithm.

103. c. Sixty-year-old woman with measured height loss of 2 centimeters
    Vertebral imaging for vertebral fracture assessment (VFA) is available on most modern DXA machines. Vertebral fracture is consistent with diagnosis of osteoporosis independent of BMD results; consider VFA for women who are age 70 or older if BMD T-score is at or below −1.0; women age 65 to 69 if BMD T-score is at or below −1.5; and postmenopausal women with a low trauma fracture during adulthood, historical height loss of 4 cm or more, prospective height loss of 2 cm or more, recent or ongoing long-term glucocorticoid treatment.

104. c. Take medication on an empty stomach.
    Client instructions for taking alendronate include the following: take medication with 8 oz of water in the morning at least 30 minutes before any beverage, food, or medication and avoid lying down for at least 30 minutes and until the first food of the day.

105. a. Amenorrhea
    DSM-5 criteria for the diagnosis of anorexia nervosa include restriction of intake relative to requirements leading to significantly low body weight in context of age, gender, and physical health; intense fear of gaining weight and/or persistent behavior that interferes with weight gain, even though the patient is at a significantly low body weight; and disturbed body image.
106. d. gamma glutamyl transferase (GGT).
An elevated GGT level may indicate heavy or chronic alcohol use.

107. c. is experiencing post-traumatic stress disorder.
Post-traumatic stress disorder (PTSD) occurs in 30–65% of sexual assault survivors. PTSD is persistent anxiety lasting more than one month following an extremely traumatic event. Inability to concentrate and nightmares are characteristic of PTSD.

108. a. loss of interest in her usual activities.
Loss of interest in usual activities and/or sad or depressed mood most of the day, every day, are required for diagnosis of major depressive disorder along with a complex of symptoms that may include fatigue, insomnia, difficulty concentrating, feelings of worthlessness, and others.

109. c. She can use any of the long-acting reversible contraceptives.
Women with uncomplicated diabetes of less than 20 years’ duration can use any of the available contraceptive methods, including long-acting reversible contraceptives such as intrauterine contraception, progestin-only injections, and progestin-only implants. Combination hormonal contraceptives are also acceptable choices.

110. d. sense of hopelessness.
Risk factors for suicide in the individual with major depressive disorder include but are not limited to sense of hopelessness, substance abuse/family history of substance abuse, prior suicide attempt/family history of suicide attempt, living alone, medical illness, advanced age, and male gender.

111. b. panic disorder with agoraphobia.
Agoraphobia is an anxiety disorder that includes avoidance of places or situations in which the ability to leave suddenly may be difficult in the event of having a panic attack. The recurrence of these panic attacks and fear related to their possible occurrence are considered panic disorder.

112. b. specific phobia.
Anxiety is one of the most prevalent of all psychiatric disorders. Specific phobia is the most common at 25%, social phobia at 13%, PTSD at 12% in women, general anxiety disorder at 5%, and panic disorder at 3.5%.

113. d. Impulsive behavior is a common characteristic.
Age of onset of bulimia nervosa is late adolescence to early adulthood. Mortality rate is lower than for anorexia nervosa. Impulsive behaviors such as shoplifting, alcohol and drug abuse, and unsafe sexual behaviors are characteristic of bulimia nervosa.

114. b. Nausea
Side effects of selective serotonin reuptake inhibitors (SSRIs) include anxiety, insomnia/hypersomnia, headache, nausea, anorexia, and sexual dysfunction.

115. a. Alprazolam (Xanax)
Alprazolam (Xanax) is a benzodiazepine that should be used only for short-term management of generalized anxiety if needed for severe impairment until acceptable reduction of symptoms is achieved with appropriate non-benodiazepine medication to include selective serotonin reuptake inhibitors, selective norepinephrine reuptake inhibitors, or buspirone and/or cognitive behavioral therapy. Benzodiazepines have a high dependence and abuse potential.

116. c. markedly increased amounts of the substance needed to achieve intoxication or desired effect.
Physiologic dependence on a substance is defined as evidence of characteristic withdrawal syndrome or use of the substance to avoid withdrawal and/or tolerance in which markedly increased amounts of the substance are needed to achieve intoxication or desired effect.

117. a. erosion of tooth enamel.
Erosion of tooth enamel may occur in the individual with bulimia nervosa as a result of frequent induced vomiting that exposes enamel to gastric acid.

118. b. The majority of rapes are committed by acquaintances of the victim.
The majority of rapes are perpetuated by an acquaintance rather than a stranger. Rape is a legal term and its definition may vary in different states but typically includes the use of force, threat, or coercion and lack of consent by the victim in relation to sexual intercourse. Initial response of the victim/survivor may range from calm to anxious to angry.

119. a. Biguanides (metformin)
Metformin, a biguanide, is an oral hypoglycemic used in the treatment of type 2 diabetes that works by decreasing hepatic glucose production and intestinal absorption of glucose and by increasing peripheral glucose uptake and utilization.

120. c. systemic corticosteroids.
Severe exacerbations (peak flow < 60%) of asthma may require the use of a short course of oral steroids for five to 10 days.

Bibliography


Advanced Practice Registered Nurse (APRN)

- Definition—a registered nurse who meets the following criteria
  1. Completes an accredited graduate-level program preparing him or her for one of four recognized APRN roles and a population focus
  2. Passes a national certification examination that measures APRN role and population competencies and maintains certification
  3. Possesses advanced clinical knowledge and skills preparing him or her to provide direct care to patients as well as a component of indirect care
  4. Builds on competencies of the registered nurse (RN) by demonstrating greater breadth and depth of knowledge and greater synthesis of data to perform more complex interventions with greater role autonomy
  5. Is educationally prepared to assume responsibility and accountability for health promotion/maintenance, assessment, diagnosis, and management of patient problems, which includes use and prescription of pharmacologic and nonpharmacologic interventions
  6. Has clinical experience of sufficient depth and breadth to reflect the intended license
  7. Obtains a license to practice as an APRN in one of the four APRN roles (APRN Consensus Workgroup & National Council of State Boards of Nursing APRN Advisory Committee, 2008)

- The four APRN roles
  1. Certified Nurse Practitioner (CNP)
     a. Definition—licensed, independent practitioner who provides primary and/or specialty health care in ambulatory, acute, and long-term care settings for individuals, families, and groups; NPs practice autonomously and in collaboration with other healthcare professionals to assess, treat, and manage acute episodic and chronic illnesses; NPs are experts in health promotion and disease prevention (American Association of Nurse Practitioners, 2015)
  b. Practice
     (1) As a primary care provider (PCP), provides care that is integrated and accessible
     (2) Emphasizes health promotion, disease prevention
     (3) Professionally, practice is autonomous, collaborative, and evidence based
     (4) Functionally, practice is defined by state law, regulations, and clinical privileges
     (5) Diagnoses, treats, and manages health problems
     (6) Teaches and counsels individuals, families, and groups
     (7) Clinical roles include researcher, consultant, and patient advocate
     (8) Professional roles include mentor, educator, researcher, and administrator
     (9) Maintains accountability for care of patients and decisions reached
  c. Core competencies of nurse practitioner practice (National Organization of Nurse Practitioner Faculties, 2012)
     (1) Scientific foundation
     (2) Leadership
     (3) Quality
     (4) Practice inquiry
     (5) Technology and information literacy
     (6) Policy
     (7) Health delivery system
     (8) Ethics
     (9) Independent practice
  d. Education
     (1) Master’s degree, post-master’s certificate, or doctorate in nursing practice (DNP)
     (2) Includes extensive clinical experience supervised by qualified preceptors within a population focus
     (3) Curriculum—APRN
        (a) Master’s-level core courses that include foundational curriculum content considered essential for all students pursuing a master’s degree in nursing regardless of functional focus (e.g., nursing theory,
organizational and systems leadership, quality improvement and safety, health policy and advocacy, interprofessional collaboration, clinical prevention and population health, ethics, research, legal issues, economics)
(b) APRN direct care core content that includes advanced health assessment, pathophysiology, pharmacology, clinical diagnosis and management, health promotion, and disease prevention
(c) Additional courses with content specific to the nurse practitioner population focus (family/individual across the life span, adult–gerontology, women's health, neonatal, pediatrics, psychiatric–mental health); includes extensive supervised clinical hours
(d) Nurse practitioner programs are accredited within schools of nursing by one of the formally recognized accreditation bodies for schools of nursing
(4) Curriculum—women's health nurse practitioner (WHNP) specific
(a) The National Association of Nurse Practitioners in Women's Health (NPWH) and Association of Women's Health, Obstetric, and Neonatal Nurses (AWHONN) (2014) jointly provide guidelines for WHNP practice and education
(b) Content includes general health assessment, gynecology, childbearing and pregnancy care, primary care health issues, male reproductive health needs/problems, clinical pharmacology/pharmacokinetics/pharmacodynamics, health maintenance and disease prevention, professional role
e. Certification—WHNP
(1) To be eligible to take the certification examination offered for the WHNP, the student must have graduated from an accredited master's degree, post–master's certificate, or DNP program in the women's health population focus
(2) WHNP certification is provided by the National Certification Corporation (NCC)
f. Certification maintenance—must be renewed every three years through one of the following mechanisms
(1) Professional development certification maintenance program—take the NCC specialty assessment evaluation, which covers topics that reflect major content areas tested on the certification examination; results determine the topics and amount of continuing education required (15 to 50 hours includes 5 hours for taking the assessment)
(2) Complete 50 continuing education hours covering all core certification knowledge competency areas
(3) Retake the certification examination
c. Practice
(1) As a primary healthcare provider, provides care that is integrated and accessible to women and families
(2) Practice is autonomous or collaborative and evidence based
(3) Provides health promotion, disease prevention, counseling, and education across the life span
(4) Diagnoses, treats, and manages common health problems
(5) Focuses on childbearing, newborn care, postpartum care, family planning, and gynecologic care
(6) Accepts accountability for care provided
(7) Of the various models of practice, private practice in a midwifery group provides the most autonomy
(8) Site of practice is in all places where women's health care is needed, including the home
d. Hallmarks of Midwifery (American College of Nurse–Midwives, 2012a)
(1) Recognition of menarche, pregnancy, birth, and menopause as normal physiologic and developmental processes
(2) Advocacy of nonintervention in normal processes in the absence of complications
(3) Incorporation of scientific evidence into clinical practice
(4) Promotion of woman- and family-centered care
(5) Empowerment of women as partners in health care
(6) Facilitation of healthy family and interpersonal relationships
(7) Promotion of continuity of care
(8) Health promotion, disease prevention, and health education
(9) Promotion of a public healthcare perspective
(10) Care to vulnerable populations
(11) Advocacy for informed choice, shared decision making, and the right to self-determination
(12) Integration of cultural humility
(13) Incorporation of evidence-based complementary and alternative therapies in education and practice
(14) Skillful communication, guidance, and counseling
(15) Therapeutic value of human presence
(16) Collaboration with other members of the interprofessional healthcare team
e. Education
(1) Master's degree, post–master's certificate, or DNP
(2) Includes extensive clinical experience supervised by qualified preceptors
(3) Some programs do not require nursing and prepare the graduate as a midwife rather than nurse–midwife
f. Curriculum—based on ACNM Core Competencies (American College of Nurse–Midwives, 2012a) that include the following components:
(1) Hallmarks of midwifery—art and science of midwifery
(2) Midwifery care: professional responsibilities
(3) Midwifery care: midwifery management process
(4) Midwifery care: fundamentals
(5) Midwifery care of women
(6) Midwifery care of the newborn
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b. Practice
(1) Direct care functions include expert practitioner, role model, patient advocate, and educator
(2) Indirect care functions include change agent, consultant or resource person, liaison person, and innovator
c. Education
(1) Master's degree, post–master's certificate, or DNP—as of 2030, a DNP will be required
(2) Curriculum includes core courses in nursing theory, organizational theory, ethics, legal issues, healthcare delivery and CNS role, and population-focused courses-supervised clinical experience
(3) CNS programs are accredited within schools of nursing by one of the formally recognized accreditation bodies for schools of nursing
(4) Certification is available for population foci through the American Nurses' Credentialing Center (ANCC)

Trends and Issues

• Primary health care

1. Definition—provision of integrated, accessible healthcare services by clinicians who are accountable for addressing a large majority of personal healthcare needs, developing sustained partnerships with patients, and practicing within the context of family and community (Institute of Medicine, 1996)

2. Terms used by Institute of Medicine (IOM) to define primary care
a. Integrated—comprehensive, coordinated care, focused on particular needs of patient, clinician continuity, patient record continuity, effective communication of information
b. Accessible—elimination of geographic, cultural, language, reimbursement barriers to care
c. Accountable—clinician and system accountability for services provided
d. Majority of personal healthcare needs—competency to manage most healthcare needs, use of consultation and referral as needed, sustained relationship between clinician and patient over time
e. Context of family and community—understanding of the circumstances of the patient that affect health and healthcare outcomes, awareness of community health trends, use of specific health promotion/disease prevention strategies within this context

3. Primary healthcare providers include family physicians, general internal medicine physicians, pediatricians, obstetricians/gynecologists, nurse midwives, and nurse practitioners

4. WHNPs and nurse-midwives are educationally prepared and qualified to be providers of primary care within their population focus

5. Issues related to APRN ability to engage in full scope of practice as primary care providers include
a. Nurse practice act regulations
b. Prescriptive authority statutes
c. Reimbursement policies
• Healthy People 2020 (U.S. Department of Health and Human Services, n.d.)
  1. Origin is the 1979 Healthy People: The Surgeon General’s Report on Health Promotion and Disease Prevention
  2. Followed by Healthy People initiatives each decade in 1990, 2000, and 2010
  3. Purpose of Healthy People 2020—provide science-based, 10-year national objectives for improving the health of all Americans; establish benchmarks and monitor progress
  4. Four overarching goals
     a. Attain high-quality, longer lives free of preventable disease, disability, injury, and premature death
     b. Achieve health equity, eliminate disparities, and improve health of all groups
     c. Create social and physical environments that promote good health for all
     d. Promote quality of life, healthy development, and healthy behaviors across all life stages

• Baby-Friendly Hospital Initiative (BFHI)
  1. Launched by World Health Organization (WHO) and UNICEF in 1991
  2. Purpose—encourage and recognize birthing hospitals and centers that offer an optimal level of care for infant feeding and mother–baby bonding
  3. Qualifications to receive a Baby-Friendly designation include
     a. Implementation of the Ten Steps to Successful Breastfeeding
     b. Compliance with the International Code on Marketing Breastmilk Substitutes
  4. Ten Steps to Successful Breastfeeding
     a. Have a written breastfeeding policy that is routinely communicated to all healthcare staff
     b. Train all healthcare staff in the skills necessary to implement this policy
     c. Inform all pregnant women about the benefits and management of breastfeeding
     d. Help mothers initiate breastfeeding within one hour of birth
     e. Show mothers how to breastfeed and how to maintain lactation, even if they are separated from their infants
     f. Give infants no food or drink other than breastmilk, unless medically indicated
     g. Practice rooming-in—allow mothers and infants to remain together 24 hours a day
     h. Encourage breastfeeding on demand
     i. Give no pacifiers or artificial nipples to breastfeeding infants
     j. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or birth center
  5. International Code on Marketing Breastmilk Substitutes
     a. No advertising of breastmilk substitutes to families
     b. No free samples or supplies in the healthcare system
     c. No promotion of products through healthcare facilities, including no free or low-cost formula
     d. No contact between marketing personnel and mothers
     e. No gifts or personal samples to health workers

• Institute of Medicine (2011): The Future of Nursing: Leading Change, Advancing Health
  1. Robert Wood Johnson Foundation and IOM partnered to assess and respond to the need to transform the nursing profession partially in response to enactment of the Affordable Care Act.
  2. Report was presented in 2010 with four key messages
     a. Nurses should practice to the full extent of their education and training
     b. Nurses should achieve higher levels of education and training through an improved education system that promotes seamless academic progression
     c. Nurses should be full partners with physicians and other health professionals in redesigning health care in the United States
     d. Effective workforce planning and policymaking require better data collection and an improved information infrastructure
  3. Recommendations in regard to each of the key messages were presented

• Doctorate in nursing practice (DNP)
  1. Practice-focused rather than research-focused nursing doctoral degree
  2. DNP Essentials established by AACN (American Association of Colleges of Nursing, 2006) for curricular elements and competencies
  3. Entry into DNP program may be after completion of baccalaureate nursing degree (BS to DNP) or master’s nursing degree (MS to DNP)
  4. Program length varies depending on BS-to-DNP/MS-to-DNP program type as well as APRN role and population focus
  5. Requires a minimum of 1,000 hours of supervised postbaccalaureate clinical experience
  7. Currently, school accrediting bodies, APRN certification agencies, and state nursing boards are not requiring a DNP degree for advanced practice registered nursing practice

• Consensus model
  2. Purpose—development of a national regulatory model for APRNs with relevant definitions, roles, and titles to be used and population foci
3. Defines four essential components for regulation (LACE)
   a. Licensure—the granting of authority to practice
   b. Accreditation—formal review and approval by a recognized agency of educational degree programs in nursing
   c. Certification—formal recognition of the knowledge, skills, and experience demonstrated by the achievement of standards identified by the profession
   d. Education—formal preparation of APRNs in graduate-degree granting or postgraduate certificate programs
4. Four APRN roles—nurse anesthetist, nurse–midwife, clinical nurse specialist, nurse practitioner
5. Six population foci—family/individual across life span, adult–gerontology, neonatal, pediatrics, women’s health, psychiatric–mental health
6. Education, certification, and licensure of individual must be congruent in terms of role and population focus
7. APRNs may specialize (e.g., palliative care, critical care) but cannot be certified or licensed solely within a specialty area
8. Identifies titles to be used by APRN
9. State boards of nursing should be solely responsible for licensing APRNs
10. Implementation of model continues to occur incrementally in states; target date for full implementation was 2015

Professional Components of Advanced Practice Registered Nursing

- This section includes professional components for CMs as well as CNMs and NPs
- Scope of practice
  1. Definition—legal authority granted to a profession to provide and be reimbursed for services
  2. Defines what APRN can do with patients, what he or she can delegate, and when collaboration with others is required
  3. Scope may differ depending on APRN role—clinical nurse specialist, nurse anesthetist, nurse–midwife, nurse practitioner
  4. Based on state laws promulgated by the various nurse practice acts and rules and regulations for APRN—varies from state to state
  5. ACNM provides a definition and scope of practice statement for CNMs and CMs (ACNM, 2011)
- Nurse practice acts
  1. Definition—legislative enactments that define the practice of nursing, give guidance within the scope of practice issues, and set standards for practice; passage through state legislatures makes these the law under which nursing is practiced
  2. Regulated state by state
  3. Authorizes state boards of nursing to establish statutory authority for the licensure of registered nurses, including APRNs
  4. Authorizes state boards of nursing to establish a scope of practice, determine disciplinary actions, and regulate its practice via legislative statutes
  5. Licensure statutes limit practice to individuals with specific qualifications as defined by law
  6. Registration and certification statutes provide a definition and limit as to who may use title, without restraint of practice
  7. May authorize prescriptive authority
  8. Regulations reflect a trend to increase APRN authority and autonomy
- Licensure
  1. Definition—process by which a government agency authorizes individuals to practice a profession or occupation by validating that the individual has attained the required degree of competency as prescribed by law to protect the public welfare
  2. State law governs the requirement for holding a professional license in the state
  3. All states require the APRN to hold a state RN license; currently, not all states require a separate APRN license
  4. CNMs are licensed through Boards of Nursing, Boards of Medicine, or Boards of Midwifery/Nurse–Midwifery
  5. CMs may receive license to practice in New Jersey, New York, and Rhode Island through Boards of Medicine, Boards of Midwifery, or State Health Department; CMs are also able to receive authorization to practice in Delaware and Missouri; ACNM encourages recognition of CMs in all states, and therefore, it is expected that more states in the future will have provisions for licensure of CMs
- Full practice authority for nurse practitioners (NPs)
  1. Definition—the collection of state practice and licensure laws that allow NPs to evaluate patients, diagnose, order, and interpret diagnostic tests; initiate and manage treatments, including prescribe medications under the exclusive license authority of the state board of nursing (American Association of Nurse Practitioners, 2015)
  2. As of January 1, 2017, 21 states and the District of Columbia have full practice authority for NPs; several other states have bills for full practice authority in process at this time
- Certification
  1. Definition—the formal process by which a private agency or organization certifies (usually by examination) that an individual has met standards as specified by that profession (Hamric, Hanson, Tracy, & O’Grady, 2014)
  2. National certification examinations provide a consistent standard that must be met by the APRN to demonstrate competency for an advanced level of practice in her or his role
  3. Midwives take the same certification examination as nurse–midwives to receive the professional designation as certified midwife
  4. Almost all states require national certification for nurse practitioners and nurse–midwives
  5. Maintenance of a particular level of competence following initial certification is required
- Prescriptive authority
  1. Definition—legal authority to prescribe medications or devices
  2. Authority is contained in state nurse or midwifery practice acts or in other statutes and varies from state to state
3. May require approval of state board of medicine, midwifery, public health, or pharmacy
4. Requires completion of an advanced pharmacology course and continuing education hours to maintain prescribing status
5. May require a collaborative practice agreement and/or written protocols
6. May obtain federal Drug Enforcement Administration (DEA) registration number, depending on scope of state law

- Independent and collaborative management of care
  1. Independent—care of women within the provider's scope of practice, based on knowledge, skills, and competencies
  2. Consultation—seeks advice or opinion of another member of the healthcare team while the NP/CNM/CM retains primary responsibility for the woman's care
  3. Collaboration—NP/CNM/CM and physician or other healthcare professional jointly manage the care of a woman with complex or complicated health conditions, the goal of which is to share authority while providing quality care within each individual's scope of practice
  4. Referral—the process by which the provider directs the client to another healthcare professional for management of a particular problem or aspect of the client's care

- Hospital privileges
  1. Definition—authorization granted to a practitioner by the healthcare network or a component of the network to provide specific in-patient care services within defined limits based on the practitioner's qualifications and current competence
  2. Hospitals may have levels of privileges determining extent of decision making permitted by the provider (e.g., review records, admit patients, write orders)
  3. Often it is the medical staff governing body that decides which other providers may have hospital privileges and at what level based on an application and review process
  4. American College of Nurse-Midwives (2006) Principles for Credentialing and Privileging of CNMs and CMs include the following:
    a. Bylaws and guidelines of hospitals/healthcare organizations should reflect the scope of practice of CNMs/CMs as defined by national standards and state laws
    b. Clinical practice guidelines should be the mechanism used to determine circumstances under which consultation or management by a physician is required
    c. Bylaws and guidelines should be written to ensure that the midwife is accountable for care provided and should avoid requirements that create vicarious liability of other healthcare professionals
    d. Bylaws and guidelines should not require routine physician co-signature on CNM/CM notes or orders in medical record
    e. Requirements for credentialing, privileging, and reprivileging of physicians and midwives should be equivalent
    f. Requirements for continuous professional practice evaluation should be consistent for procedures performed by both midwives and physicians, and midwives should be included in development of such guidelines
    g. A broad definition of medical or professional staff that does not designate categories of providers should be used
    h. Delineation of CNM/CM privileges should clearly state that they can admit and discharge patients and should provide a mechanism for recognizing expanded practices distinguished from the standard privileges granted to midwives

- Standards of practice
  1. Definition—overarching statements that the nursing profession uses to describe the responsibilities of its members to provide safe and competent care
  2. APRNs are held to standards of practice promulgated by the nursing profession and standards determined by professional organizations representing their role and population focus
  3. American Association of Nurse Practitioners (2013) Standards of Practice for Nurse Practitioners include:
    a. Process of care—assessment, diagnosis, development of treatment plan, implementation of plan, follow-up, and evaluation of patient status
    b. Care priorities—patient and family education, facilitation of patient participation in self-care, promotion of optimal health, provision of continually competent care, facilitation of entry into healthcare system, promotion of a safe environment
    c. Interdisciplinary and collaborative responsibilities
    d. Accurate documentation of patient status and care
    e. Responsibility as patient advocate
    f. Quality assurance and continued competence
    g. Adjunct roles of nurse practitioners—e.g., mentor, educator, researcher, consultant, manager
    h. Research as basis for practice

4. American College of Nurse-Midwives (2011) Definition of Midwifery and Scope of Practice of Certified Nurse Midwives and Certified Midwives includes that midwifery care:
   a. Is provided by qualified practitioners
   b. Occurs in a safe environment within the context of the family, community, and a system of health care
   c. Supports individual rights and self-determination within boundaries of safety
   d. Is composed of knowledge, skills, and judgments that foster the delivery of safe, satisfying, and culturally competent care
   e. Is based on knowledge, skills, and judgments that are reflected in written practice guidelines and are used to guide the scope of midwifery care and services provided to clients
   f. Is documented in a format that is accessible and complete
   g. Is evaluated according to an established program for quality management that includes a plan to identify and resolve problems
   h. May be expanded beyond the ACNM core competencies to incorporate new procedures that improve care for women and their families

- Standards of care
  1. Definition—also called practice guidelines; define a standard of appropriate care; used in legal decisions about care provided
  2. Standards of care are evidence based and continuously evolving
  3. APRNs are responsible to remain up to date on these standards/guidelines
4. Examples of sources of practice guidelines include Agency for Healthcare Research and Quality (AHRQ), Centers for Disease Control and Prevention (CDC), professional medical and nursing specialty organizations.

- Professional organizations

1. Purposes and benefits of membership
   a. Purposes of professional nursing organizations
      (1) Promote and set high standards for health care
      (2) Enhance the identity, visibility, and practice of its members
      (3) Provide a collective voice to promote the profession of nursing and the APRN role
   b. Individual benefits
      (1) Membership within a community of like providers who share commonalities specific to their specialty areas
      (2) Networking availability through participation in local, regional, and national meetings, alliances, and coalitions
      (3) Legislative representation, support, and participation at all levels
      (4) Continuing education programs to attain/maintain clinical competency
      (5) May provide consultation and assistance in securing federal scholarship and loans for continuation of study
      (6) Receipt of organizational publications
      (7) Listings of employment opportunities
      (8) Professional recognition of excellence in practice and research
   2. Organizational activities
      a. Provides, fosters, and facilitates leadership for and among members
      b. Disseminates information relevant to practice
      c. Monitors and influences laws and regulations
      d. Produces position papers communicating organizational perspectives on issues of concern
      e. Establishes practice competencies and standards and may offer continuing education resources
      f. Enhances the visibility of the members through marketing, public relation efforts
      g. May construct and maintain a national database of all provider activities
      h. Encourages and supports research efforts
   3. Professional organizations relevant to women’s health nurse practitioners and nurse–midwives include but are not limited to
      a. American College of Nurse–Midwives (ACNM)
      b. National Association of Nurse Practitioners in Women’s Health (NPWH)
      c. Association of Women’s Health, Obstetrics, and Neonatal Nurses (AWHONN)

- Reimbursement—third-party payers

1. Medicare—federal program that provides health insurance for those older than 65 years or disabled; not income dependent; four parts: A, B, C, and D
   a. Part A—hospital insurance
      (1) No fee for enrollment—covered by payroll taxes; cost sharing may include deductibles and coinsurance
   b. Part B—supplementary medical insurance if eligible for Part A
      (1) Pay monthly premium
      (2) Covers provider services, outpatient coverage, diagnostics, and durable medical equipment
      (3) Some preventive services are mandated to be covered with no deductible or copay
   c. Part C—Medicare Advantage Plan
      (1) Available through participation in coordinated care or private fee-for-service plans and medical savings accounts
      (2) Covers same services as Part B
   d. Part D—Prescription drug coverage
      (1) Pay monthly premium
      (2) May include deductible or copay
   e. APRN qualifications to be a Medicare provider
      (1) Current RN and APRN license to practice in state in which services rendered
      (2) National certification in an advanced practice nurse role
      (3) Master’s degree in nursing
      (4) National Provider Identifier (NPI) number—obtained from Centers for Medicare and Medicaid Services (CMS)
   f. Fee-for-service Medicare—APRN submits bills to local Medicare carrier agent for each visit or procedure; NP reimbursed at 85% of physician fee for same service; CNM reimbursed at 100%
   g. Capitated Medicare—fee paid to healthcare provider; per patient, per month, for care of Medicare patient enrolled in managed care organization (MCO); APRN applies to MCO to be on panel of providers
   h. “Incident to” services—services are billed at 100% under supervising physician’s NPI number; physician must be present in office suite; does not include APRN seeing patient for an initial visit or subsequent visit with a new problem; physician must demonstrate ongoing participation in the management of the patient’s care; limits APRN autonomy and professional visibility

2. Medicaid—federal program administered by the states to cover mandated healthcare costs for eligible low-income individuals and families
   a. Pregnant women and children younger than 6 years of age with family incomes up to 133% of the federal poverty level
   b. Children who are younger than age 19, in families whose income is at or below poverty level
   c. Adults with short-term (one year or less) disability and who qualify on basis of poverty
   d. Other adults without short-term disability or children may also qualify on basis of poverty
   e. General coverage includes:
      (1) Hospital and provider services
      (2) Laboratory and radiologic services
      (3) Nursing home and home healthcare services
      (4) Prenatal and postpartum care
      (5) Preventive services
      (6) Medically necessary transportation
      (7) States may opt to cover additional services
Types of managed care plans include:

1. Health maintenance organization (HMO)—patient is assigned or chooses a primary care provider who manages total care and must make referrals for patient to see a specialist and for nonemergency hospital admissions
   a. Healthcare providers are paid a preset amount in advance for all services the insured population is projected to need over a period of time
   b. Capitation—a method that pays providers for services; a per-member, per-month basis is a common form of prepayment; incentive to provider to contain costs of care provided

2. Preferred provider organization (PPO)—MCO contracts with independent providers for negotiated fee-for-service; patient can choose provider; PPO guarantees a certain volume of business to hospitals and providers in return for negotiated discount in fees

3. Point-of-service (POS) plan—utilizes some of features of both HMO and PPO; patients may choose to see whichever provider they want either in the network plan or out of the network, although they pay more for out-of-network care

c. If APRN is employee of a group practice, someone within the group negotiates terms of MCO contract for the group

d. If APRN is in private practice, he or she applies to the MCO to be a provider and negotiates terms of contract

e. Not all MCOs currently recognize APRNs as primary care providers

Healthcare Delivery Systems

• Traditional health care

1. Emphasizes independent providers

2. Characteristics
   a. Providers chosen by patient with little, if any, influence from third-party payer
   b. Provider reimbursed by patient and insurers in fee-for-service arrangement
   c. Insurers reimburse according to usual, customary, and reasonable system

• Integrated delivery systems/MCOs

1. A health delivery system that strives to provide high-quality, cost-effective care through a coordination of health services provided by a variety of caregivers; shifting emphasis from a fee-for-service strategy to one in which the network of providers assumes some degree of responsibility for both provision and cost of care

2. Characteristics
   a. Varying levels of care that are coordinated into a seamless system
   b. Capitated system of payment/prospective pricing
      (1) Financial risk assumed by provider
      (2) Unit of value is cost per member, per month (PMPM), determined in advance by contract (prospectively)
      (3) To remain financially solvent, target population should be healthy, which means that they consume the least dollars for care provided

c. Low-cost, high-quality service with emphasis on health promotion

d. Service bundling, where complementary care can be offered as a package, further reduces costs

**Ethical and Legal Issues and Principles**

- **Ethics and the law**
  1. Law is founded on rules that guide a society, regardless of personal views and values
  2. Ethical values are affected by moral, philosophical, and individual interpretation
  3. These areas intertwine, creating dilemmas in the provision of health/medical care
  4. **MORAL model of ethical decision making:**
     a. Manage the dilemma—define issues, consider options, identify players
     b. Outline the options—examine these fully
     c. Resolve the dilemma—apply basic ethical principles to each option
     d. Act by applying the chosen option
     e. Look back and evaluate the entire process

- **Ethical principles in health care**
  1. Autonomy—individuals have the right to self-determine the course of treatment they find most acceptable and with whom information may be shared
  2. Beneficence—the actions one takes as a healthcare professional should promote good
  3. Nonmaleficence—the actions one takes as a healthcare professional should do no harm
  4. Veracity—the healthcare professional should be truthful when giving individuals information about their healthcare needs
  5. Fidelity—the healthcare professional should keep one’s promises or commitments made in the therapeutic relationship
  6. Justice—the healthcare professional should advocate for fair and equal treatment for all individuals

- **Legal liability and risk management in providing care**
  1. Malpractice—failure of the healthcare professional to exercise the degree of skill and learning commonly applied by the average prudent, reputable member of the profession; falls under tort law
  2. Tort law—a branch of civil law (rather than criminal law) that concerns legal wrongs committed by one person against another; an act that causes harm to body or property and for which the injured party is seeking monetary damages; includes assault, battery, intentional infliction of emotional distress, negligence
  a. Intentional tort—a volitional or willful act, with expressed intent to bring harm to the affected person; forms the foundation for consent for treatment requirements (see “Consent” later in this section)
  (1) Assault—intentional threat by word or act to unlawfully touch or strike a person, coupled with apparent ability, and causing fear in that person that such an act is imminent
  (2) Battery—actual, intentional, and unlawful touching or striking of another person against the will of the other
  (3) False imprisonment—unlawful restraint or detention against the will of the individual
  (4) Intentional infliction of emotional distress—intentional infliction of emotional or mental distress that results in mental reaction such as anguish, grief, or fright to another person
  b. Negligence tort—involves an act of negligence; conduct lacking in due care; carelessness; doing something any reasonable, prudent person would not do
  (1) Most malpractice suits are based on negligence; requires the following four elements to be present:
     a. **Duty**—the responsibility to act in accordance with a standard of care
     b. Breach of duty—violation or deviation from the standard of care
     c. Causation—determination of whether the injury is the result of negligence
     d. Damages—must be actual harm to the person or property
  3. **Breach of confidentiality**—may be an intentional tort, negligence tort, basis of disciplinary action by state health professional regulation board, or violation of state or federal law
  4. Consent—a legal action given by a patient to undergo particular treatments and/or procedures; informed consent—agreement to do something or to allow something to happen only after all the relevant facts are disclosed
  a. Most states have legislation regarding what types of tests, treatments, or procedures require written informed consent and who is authorized to provide informed consent for a minor, or for an incompetent or an incapacitated person
  b. Components of a written informed consent generally include descriptions of procedures and/or treatments and/or tests; potential risks and benefits; and alternatives with documentation that the patient is acting voluntarily, has received full disclosure, and is competent to act
  c. Refusal of treatment—the inherent right of conscious and mentally competent individuals to refuse any form of treatment either personally or through their representative; includes do not resuscitate (DNR) orders, refusal for extraordinary care, and implementation of supportive-care-only guidelines
  d. Withdrawal of treatment—the decision to terminate treatment that has been initiated after securing informed consent from a patient or the patient’s representative, with the legal basis for decision and subsequent care as noted in refusal of treatment
  5. Coworker incompetence—a legal obligation exists for a licensed professional to assist, relieve, or report any coworker who, through substandard care or impairment, places the health and welfare of patients at risk; official processes relevant to continued practice are determined through agencies and state boards, based on practice act regulations
  6. **Health Insurance Portability and Accountability Act (HIPAA)**
  a. Purpose of HIPAA privacy rule provisions (implemented in 2003)—ensure that individual’s health information is properly protected while allowing the flow of information needed to promote high-quality health care and to protect the public’s health and well-being
b. Definitions
   (1) Covered entity—the privacy rule applies to health plans, healthcare clearinghouses, and any healthcare provider who transmits health information in electronic form in connection with transactions
      (a) Health plan—individual and group plans that provide or pay the cost of medical care
      (b) Healthcare clearinghouse—billing services, community health management systems
      (c) Healthcare provider—institutions (e.g., hospitals, health networks) and direct care providers who electronically transmit health information in connection with transactions for which the U.S. Department of Health and Human Services (USDHHS) has established privacy standards (e.g., claims, benefit eligibility inquiries, referral authorization requests)
   (2) Protected health information (PHI)—all individually identifiable health information held or transmitted by a covered entity in any form, that is, electronic, paper, oral; pertains even if individual is deceased

c. Required disclosures by covered entities include
   (1) To individuals (or their personal representatives) specifically when they request access to or an accounting of disclosures of their PHI
   (2) To the USDHHS when it is undertaking a compliance investigation or enforcement of action

d. Permitted disclosures by covered entities include but are not limited to
   (1) The individual who is the subject of the PHI
   (2) The entity’s own treatment, payment, and healthcare operation activities
   (3) Informal permission that clearly gives the individual the opportunity to agree or object and if the healthcare provider exercises professional judgment that the use or disclosure of PHI is determined to be in the best interest of the individual
   (4) Public health interests (e.g., communicable disease reporting, abuse or neglect reporting, serious threat to health or safety)

e. Notice of privacy practices—each covered entity (with certain exceptions) must provide a notice to all patients of its privacy practices, including individual rights and how to exercise them

f. Administrative requirements—implement policies and procedures designed to comply with privacy rule, designate privacy official to monitor compliance

g. Complaint process—informal review may resolve issue fully without formal investigation; if not, begin investigation; Office for Civil Rights enforces the privacy rule with potential monetary penalties and imprisonment depending on intent of violation

7. Risk management plan—demonstrates that the APRN is cognizant of risks, is taking reasonable steps to limit risk, and seeks to provide care consistent with best practice; includes practice policies and procedures to include but not limited to
   a. Role and scope of practice
   b. Licensing and certification requirements
   c. Practice guidelines and standards

d. Health record documentation standards and forms

e. Informed consent policy and process

f. Protection of privacy/confidentiality policy and process

g. Collaborative practice relationships

h. Provisions of practice coverage
   i. Peer review and outcomes-based evaluation processes
   j. Patient complaint or concern review process

8. Professional liability insurance
   a. Recommended that each clinician carry individual policy
   b. Types of coverage
      (1) Occurrence—covers event of malpractice that occurred during the policy period without regard to when the claims are reported; provides protections for each policy period indefinitely; broadest protection available
      (2) Claims made—incident must happen and be reported while policy is in force; requires purchase of a tail policy to protect, once policy period ends
   c. Cost of insurance varies with APRN role and population focus

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**Evidence-Based Practice**

- Definition—the conscientious, judicious, and explicit use of current best evidence in making decisions about the care of individual patients, incorporating both clinical expertise and patient values

1. Models for implementing evidence-based practice generally include the following steps
   a. Identification of a clinical problem or question
   b. Search for the best evidence
   c. Critical appraisal of the strength of evidence
   d. Recommendation for action (change, no change, further study)
   e. Implementation of the change if recommended
   f. Evaluation of change in relationship to desired outcomes

2. Categories of strength of reviewed evidence from individual research and other sources
   a. Level I (A–D)—meta-analysis or multiple controlled studies
   b. Level II (A–D)—individual experimental study
   c. Level III (A–D)—quasi-experimental study
   d. Level IV (A–D)—nonexperimental study
   e. Level V (A–D)—case report or systematically obtained, verifiable quality, or program evaluation data
   f. Level VI—opinion of respected authorities; this level also includes regulatory or legal opinions

3. Level I is the strongest rating per type of research; however, quality for any level can range from A to D and reflects basic scientific credibility of the overall study; A indicates a very well-designed study; D indicates the study has a major flaw that raises serious questions about the believability of the findings

4. Methodologies for research
   a. Quantitative research—formative, objective, systematic study process to describe and test relationships and/or to examine cause-and-effect interactions among variables
   b. Qualitative research—systematic, interactive, subjective approach used to describe life experiences and give them meaning
• Major quantitative research study designs
  1. Descriptive—used to explore and describe phenomena in real-life situations, identify and describe variables within the phenomenon, develop conceptual and operational definitions for variables
  2. Correlational—used for systematic investigation of relationships between two or more variables to explain type (positive or negative) relationships but not to examine cause and effect
  3. Quasi-experimental—conducted to explain relationships, clarify why certain events happen, and examine causality between selected independent and dependent variables; limited control developed to provide alternative for examining causality in situations not conducive to experimental-level controls
  4. Experimental—provides the greatest amount of control possible to examine probability and causality among selected independent and dependent variables for the purpose of predicting and controlling phenomena

• Major clinical categories of primary research and common types of studies used
  1. Therapy—tests the effectiveness of a treatment; randomized, double-blinded, placebo-controlled
  2. Diagnosis and screening—measures the validity and reliability of a test or evaluates the effectiveness of a test in detecting disease at a presymptomatic stage, for example, cross-sectional survey
  3. Causation or harm—assesses whether a substance is related to the development of an illness or condition, for example, cohort or case-control
  4. Prognosis—determines the outcome of a disease, for example, longitudinal cohort study
  5. Systematic review—a summary of the literature that uses explicit methods to perform a thorough literature search and critical appraisal of individual studies and that uses appropriate statistical techniques to combine these valid studies
  6. Meta-analysis—a systematic review that uses quantitative methods to summarize results

• Research terminology
  1. Reliability—represents the consistency of the measure obtained in a study
  2. Internal validity—extent to which the effects detected in a study are a true reflection of reality and not the result of the effects of extraneous variables
  3. External validity—extent to which study findings can be generalized beyond the sample used in the study
  4. Generalization—extends the implications of the findings from the sample studied to a larger population or from the situation studied to a larger situation
  5. Replication—reproducing or repeating a study to determine whether similar findings will be obtained

• Ethics in research
  1. Protection of human rights in research includes
    a. Self-determination
    b. Privacy
    c. Autonomy
    d. Confidentiality
    e. Fair treatment
    f. Protection from discomfort and harm
  2. Components of informed consent for study participants
    a. Purpose of study
    b. Role of the participant
    c. Risks and discomforts
    d. Benefits
    e. Alternatives
    f. Assurance of anonymity and/or confidentiality
    g. Any compensation for participation
    h. Explanation that participation is voluntary and can refuse to participate without any penalty
    i. Option to withdraw
    j. Offer to answer questions
    k. Institutional review—committee of researcher’s peers examines the study for ethical concerns
  3. Drug research trials—FDA investigational new drug regulations for clinical study has three phases
    a. Phase I clinical evaluation—first testing of new drug compound to establish tolerance of healthy human subjects at different doses; define pharmacologic effects at anticipated therapeutic levels; study absorption, distribution, metabolism, excretion in humans
    b. Phase II clinical evaluation—controlled studies on a small number of patients with the target disease or disorder to determine the drug’s potential usefulness and short-term risks
    c. Phase III clinical evaluation—controlled and uncontrolled studies of the drug’s safety and effectiveness in hospital and outpatient settings; gather information on the drug’s effectiveness for specific indications, any adverse effects, best way to administer and use drug for purpose intended
    d. If drug is approved, the Phase III clinical trial information forms the basis for the content of the product label

Questions

Select the best answer.

1. Which of the following is not one of the six population foci for the APRN established by the consensus model for APRN regulation?
   a. Critical care
   b. Neonatal
   c. Pediatrics
   d. Women’s health

2. Which of the following statements concerning the doctorate in nursing practice (DNP) program is correct?
   a. It requires a minimum of 500 hours of supervised clinical experience.
   b. Individuals must already be certified as an APRN before entry into the DNP program.
   c. The program focus is on practice more so than research.
   d. The DNP Essentials were developed by professional advanced practice nursing organizations.
3. The Hallmarks of Midwifery would not allow for which of the following?
   a. Advocacy of regular use of technologic interventions
   b. Informed choice with participatory decision making
   c. Therapeutic value of human presence
   d. Recognition of women's life phases as normal, developmental processes

4. Prescriptive authority in all states requires that the APRN:
   a. apply to the state medical licensing board.
   b. complete specified pharmacologic educational requirements.
   c. obtain a Drug Enforcement Administration (DEA) registration number.
   d. practice under a collaborative agreement with a physician.

5. The nongovernmental validation of a nurse practitioner's or nurse-midwife knowledge and acquired skills in a particular population focus is:
   a. licensure.
   b. credentialing.
   c. certification.
   d. registration.

6. The best source of information on APRN-specific requirements for prescriptive authority is:
   a. the federal Drug Enforcement Administration (DEA).
   b. professional APRN organizations.
   c. state boards of nursing.
   d. state boards of pharmacy.

7. The goal of an integrated system of healthcare/managed care organization is:
   a. control of costs through member selection.
   b. reduction of costs through employment of fewer physicians.
   c. to make available unlimited health services under one plan.
   d. to provide low-cost, high-quality service.

8. Which of the following best describes capitation as a financial strategy?
   a. Predetermined payment for services based on an accepted schedule of fees
   b. Predetermined fees set for usual and customary care
   c. Predetermined payment based on contractual per-member, per-month rate
   d. Predetermined rates negotiated monthly for each participating member

9. The purpose of HIPAA is to:
   a. decrease the expenses and therefore the costs of healthcare delivery.
   b. improve the health system by standardizing the exchange of electronic data.
   c. reimburse providers and laboratories in a timely fashion.
   d. ensure that every person has ready access to appropriate health care.

10. A covered entity under HIPAA may be any of the following except:
    a. any health provider who transmits any health information electronically.
    b. any patient who has health records in a format that can be transmitted electronically.
    c. governmental agencies that license healthcare providers.
    d. insurance companies that pay for cost of medical care for patients.

11. A goal of the privacy rule of HIPAA is to:
    a. provide federal protections for privacy and preserve quality care.
    b. ensure that research subjects' privacy is maintained during the study.
    c. guarantee that the privacy of patients is protected at any cost.
    d. increase the level of confidentiality in Medicaid programs.

12. One of the principal differences between Medicare Parts A and B is:
    a. eligibility.
    b. rate of reimbursement.
    c. monthly premium requirement for Part A.
    d. monthly premium requirement for Part B.

13. Managed care organization (MCO) characteristics include all of the following except:
    a. capitated system of payment.
    b. opportunity for service bundling.
    c. payment to APRN restricted to "incident to" billing.
    d. some financial risk assumed by the provider.

14. Nurse practitioners with Medicare provider status:
    a. receive reimbursement at 85% of physician payment for services provided.
    b. must become a member of a managed care organization to receive reimbursement.
    c. can have more autonomy if they use "incident to" billing.
    d. can receive direct reimbursement under Medicare Part D.

15. A National Provider Identifier (NPI) number can be obtained from:
    a. the Centers for Medicare and Medicaid Services (CMS).
    b. the Drug Enforcement Administration (DEA).
    c. a managed care organization (MCO).
    d. the state board of nursing.

16. All states are required to provide Medicaid to:
    a. children younger than 19 in families whose income is below poverty level.
    b. families eligible for the federal Children's Health Insurance Program (CHIP).
    c. individuals with long-term disabilities that have incomes below poverty level.
    d. individuals older than 65 years with a chronic medical condition who have incomes below poverty level.

17. Which of the following statements concerning "incident to" billing is correct?
    a. It applies to both Medicare and Medicaid billing.
    b. It can be used when an APRN sees a patient for any visit other than the initial visit.
    c. It promotes the visibility and status of advanced practice nurses.
    d. It requires that the physician demonstrate ongoing involvement in the patient's care.

18. Keeping one's promises or commitments is called:
    a. beneficence.
    b. fidelity.
    c. veracity.
    d. justice.

19. To maintain AMCB certification, the midwife must:
    a. apply for renewal every three years.
    b. complete three maintenance modules plus 20 contact hours of continuing education every five years.
    c. document at least 1,000 clinical hours as a midwife in the previous three years.
    d. take the certification examination every five years.
20. During a malpractice hearing, an attorney describes the responsibility "to do no harm." The attorney is defining the ethical principle of:
   a. justice.
   b. veracity.
   c. fidelity.
   d. nonmaleficence.
21. A nurse practitioner or midwife fails to order a test that is clinically indicated. This omission is best described as:
   a. maleficence.
   b. assault.
   c. an intentional tort.
   d. negligence.
22. A patient presents with an abnormal test result. The appropriate plan of care is to refer for additional testing, but the facility that performs the test has closed for the day. Rather than sending the patient to have the test performed at the hospital, the nurse practitioner or midwife in the practice orders the patient to report to the testing facility the next morning. During the evening, problems arise and the patient is admitted to the hospital with a negative outcome. This is an example of:
   a. an intentional tort.
   b. a negligence tort.
   c. inappropriate cause for malpractice suit.
   d. withdrawal of treatment without consent.
23. Placing an intrauterine contraceptive device in the uterus of an intellectually disabled patient who is not able to give informed consent may constitute:
   a. assault.
   b. battery.
   c. intentional tort.
   d. paternalism.
24. An elderly woman enters a nursing home after breaking her hip and signs DNR orders and a statement that she does not want extraordinary care. She is:
   a. exercising her right to refuse treatment.
   b. exercising her right to withdraw treatment.
   c. acting in a manner that should cause concern about her mental competence.
   d. lacking information needed to make an informed decision.
25. A women's health nurse practitioner receives a call from an attorney, who tells her she is named in a suit related to an obstetric incident that occurred four years ago. When she calls the insurance company, she is told that the policy she had at that time will not cover her because the policy was:
   a. a claims made policy.
   b. tail insurance only.
   c. an occurrence policy.
   d. an HMO policy.
26. Randomized controlled trials (RCTs) are most appropriate for what type of research study?
   a. Diagnosis and screening
   b. Therapy
   c. Causation or harm
   d. Prognosis
27. Which of the following types of research would receive the strongest rating for strength of evidence?
   a. Case report
   b. Experimental study
   c. Meta-analysis
   d. Quasi-experimental study
28. To maintain NCC certification, the WHNP must:
   a. apply for renewal every five years.
   b. complete a specialty assessment evaluation that determines the topics and number of hours of continuing education needed before the next renewal cycle.
   c. document at least 2,000 clinical hours as a WHNP in the previous five years.
   d. take the certification examination every five years.
29. According to the consensus model for APRN, what entity will be responsible for licensing APRNs?
   a. Advanced practice professional organizations
   b. Individual state boards of nursing
   c. National certification agencies
   d. National Council of State Boards of Nursing
30. A purpose of qualitative research is to:
   a. describe life experiences and give them meaning
   b. examine cause and effect interactions among variables
   c. identify and describe variables within a phenomenon
   d. investigate relationships between two or more variables
31. Which of the following is not one of the essential components for regulation of APRNs described in the Consensus Model?
   a. Certification
   b. Collaboration
   c. Education
   d. Licensure
32. The research design in which the relationships between two or more variables are explained but cause and effect are not examined is:
   a. correlational.
   b. descriptive.
   c. experimental.
   d. quasi-experimental.
33. The A–D category applied to strength of evidence in research is based on:
   a. the ability to replicate the study with the same findings.
   b. the quality of the design of the study.
   c. a review by a panel of experts.
   d. the type of research study design.
34. Weighing yourself on the same scale 10 times in a row to see if you weigh the same each time is a measure of:
   a. external validity.
   b. generalization.
   c. internal validity.
   d. reliability.
35. Which of the following statements is true concerning Phase III clinical evaluation in drug research trials?
   a. Drug absorption, distribution, metabolism, and excretion in humans are studied.
   b. A drug is tested to establish tolerance in healthy subjects at different doses.
   c. A drug is tested on small number of patients with the target disease to determine potential short-term risks.
   d. Drug safety and effectiveness are evaluated with both controlled and uncontrolled studies.
36. The Institute of Medicine definition of primary care is based on:
   a. the setting where care is provided.
   b. the type of provider.
   c. the context in which care is provided.
   d. ultimate oversight by physicians.

37. The best place for the APRN to find comprehensive standards of practice related to her or his particular role and population focus is:
   a. a national certification organization.
   b. a professional organization representing the role and population focus.
   c. the state board of nursing.
   d. the school of nursing accreditation body.

38. Which of the following hospital regulations would be against the principles for credentialing and privileging of CNMs and CMs established by the ACNM?
   a. Guidelines that ensure the midwife is accountable for care provided and that avoid placing liability on other healthcare professionals.
   b. Mechanisms designated to determine the circumstances under which consultation or management by a physician is required.

39. The CDC Sexually Transmitted Diseases Treatment Guidelines best fit the definition for:
   a. expert opinion.
   b. scope of practice parameters.
   c. standard of care.
   d. standard of practice.

40. The term used to indicate that the implications of the findings of a study with a particular population can be extended to a larger population is:
   a. generalization.
   b. external validity.
   c. internal validity.
   d. replication.

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**Answers with Rationales**

1. **a. Critical care**
   
   The six population foci are family/individual across the life span, adult–gerontology, neonatal, pediatrics, women’s health, psychiatric–mental health.

2. **c. The program focus is on practice more so than research.**
   
   Entry into a DNP program may occur after completion of baccalaureate nursing degree (BS-DNP) or master’s nursing degree (MS-DNP). Programs require a minimum of 1,000 hours of supervised postbaccalaureate clinical experience. The DNP Essentials were established by the American Association of Colleges of Nursing (AACN).

3. **a. Advocacy of regular use of technologic interventions**
   
   The Hallmarks of Midwifery include advocacy for nonintervention in normal processes in the absence of complications.

4. **b. complete specified pharmacologic educational requirements.**
   
   Individual states may require approval of the state board of medicine, although the majority of states have APRN prescriptive authority in nurse and midwifery practice acts. Some states, but not all, have a collaborative agreement requirement. DEA registration may be obtained depending on individual state scope of practice laws.

5. **c. certification.**
   
   Certification is the formal process by which a private agency or organization certifies (usually by examination) that an individual has met standards as specified by that profession. Almost all states require national certification for nurse practitioners and nurse-midwives.

6. **c. state boards of nursing.**
   
   Authority for prescriptive authority is contained in state nurse or midwifery practice acts or in other statutes that vary from state to state. Additional approval may be required from other state boards.

7. **d. to provide low-cost, high-quality service.**
   
   Integrated delivery systems/managed care organizations strive to provide high-quality, cost-effective care through coordination of services; there is a shift in emphasis from a fee-for-service strategy to one in which a network of providers assumes some responsibility for provision and cost of care.

8. **c. Predetermined payment based on contractual per-member, per-month rate**
   
   Capitated systems of payment/prospective pricing are set as cost per member, per month (PMPM), determined in advance by contract (prospectively).

9. **b. improve the health system by standardizing the exchange of electronic data.**
   
   The purpose of the Health Insurance Portability and Accountability Act (HIPAA) is to ensure that individuals’ health information is properly protected while allowing the flow of information needed to promote high-quality health care and to protect the public’s health and well-being.

10. **c. governmental agencies that license healthcare providers.**
    
    HIPAA-covered entities (those to whom the privacy rules apply) include health plans, healthcare clearinghouses, and any healthcare provider who transmits health information in electronic form in connection with transactions.

11. **a. provide federal protections for privacy and preserve quality care.**
    
    For the most part, HIPAA privacy rules apply to all protected health information (PHI). There are two situations in which a covered entity is required to share PHI and at least four situations in which the covered entity may be permitted to disclose PHI.

12. **d. monthly premium requirement for Part B.**
    
    Part B is supplementary medical insurance available to individuals for a monthly premium if they are eligible for Part A. Part B covers provider services, outpatient care, diagnostics, and durable medical equipment.

13. **c. payment to APRN restricted to "incident to" billing.**
    
    "Incident to" billing is for Medicare services provided by the APRN under the supervision of a physician and does not include initial visits or subsequent visits with a new problem.

14. **a. receive reimbursement at 85% of physician payment for services provided.**
    
    In fee-for-service Medicare, NPs are reimbursed at 85% and nurse-midwives at 100% of the physician fee for the same service.
15. a. the Centers for Medicare and Medicaid Services (CMS). The APRN obtains a National Provider Identifier number from CMS.

16. a. children younger than 19 in families whose income is below poverty level. States must provide Medicaid coverage to the following groups if they meet specified income-eligibility requirements—pregnant women and children under age 6, children younger than 19, adults under 65 without dependent children, and adults with short-term disability.

17. d. It requires that the physician demonstrate ongoing involvement in the patient’s care.

“Incident to” billing is for Medicare services provided by the APRN under the supervision of a physician and does not include initial visits or subsequent visits with a new problem. Billing as a Medicare provider rather than “incident to” promotes the visibility and status of APRNs.

18. b. fidelity.
Fidelity is the ethical principle of the healthcare professional keeping one’s promises or commitments made in a therapeutic relationship.

19. b. complete three maintenance modules plus 20 contact hours of continuing education every five years.
AMCB certification must be renewed every five years with completion of three maintenance modules plus 20 contact hours of continuing education or retaking the AMCB certification examination (no sooner than the fourth year of cycle) plus 20 contact hours of continuing education.

20. d. nonmaleficence.
Nonmaleficence is the ethical principle of the healthcare professional doing no harm in actions taken.

21. d. negligence.
Negligence is conduct lacking in due care; carelessness.

22. b. a negligence tort.
A negligence tort involves conduct lacking in due care or careless conduct. Most malpractice cases are based on negligence.

23. b. battery.
Battery is the actual, intentional, and unlawful touching or striking of another person against the will of that person.

24. a. exercising her right to refuse treatment.
Refusal of treatment is the inherent right of a conscious and mentally capable individual to refuse any form of treatment either personally or through the person’s legal representative.

25. a. a claims made policy.
With claims made policies, the incident must happen and be reported while the policy is in force to be covered.

26. b. Therapy
The clinical research category of therapy is that in which the effectiveness of a treatment is being tested. Randomized, double-blinded, placebo-controlled trials (RCTs) provide the strongest evidence for this category of clinical research.

27. c. Meta-analysis
Level I (meta-analysis or multiple controlled studies) is the strongest rating; however, quality may range from A to D, with A indicating a very well-designed study and D indicating the study has a major flaw that raises serious questions about the believability of the findings.

28. b. complete a specialty assessment evaluation that determines the topics and number of hours of continuing education needed before the next renewal cycle.
NCC certification must be renewed every three years with completion of a specialty assessment evaluation that determines the topics and number of hours of continuing education needed (15–50) before the next renewal cycle or completion of 50 continuing education hours covering all core certification knowledge areas or retaking the certification examination.

29. b. Individual state boards of nursing
According to the consensus model, state boards of nursing will be solely responsible for licensing APRNs.

30. a. describe life experiences and give them meaning
Qualitative research is defined as a systematic, interactive, subjective approach used to describe life experiences and give them meaning.

31. b. Collaboration
The Consensus Model describes four essential components for regulation of APRNs—licensure, accreditation, certification, and education commonly referred to as LACE.

32. a. correlational.
Correlational research study designs are used for systematic investigation of relationships between two or more variables to explain type (positive or negative) relationships, but not to examine cause and effect.

33. b. the quality of the design of the study.
Categories of strength of evidence from research studies are based on a combination of the research design (Levels I–VI) used (e.g., meta-analysis, experimental) and the quality of the design of the study (Levels A–D) that affects believability of the findings.

34. d. reliability.
Reliability represents the consistency of a measure obtained in a study.

35. d. Drug safety and effectiveness are evaluated with both controlled and uncontrolled studies.
Phase III clinical evaluation involves controlled and uncontrolled studies of the drug’s safety and effectiveness in hospital and outpatient settings; gathers information on the drug’s effectiveness for specific indications, any adverse effects, and the best way to administer and use the drug for the purpose intended; and forms the basis of the content of the product label.

36. c. the context in which care is provided.
The Institute of Medicine definition of primary care is provision of integrated, accessible healthcare services by clinicians who are accountable for addressing a large majority of personal healthcare needs, developing sustained partnerships with patients, and practicing within the context of family and community (Institute of Medicine, 1996).

37. b. a professional organization representing the role and population focus.
Standards of practice are overarching statements that the nursing profession uses to describe the responsibilities of its members to provide safe and competent care. APRNs are held to standards of practice promulgated by the nursing profession and standards determined by professional organizations representing their role and population focus.

38. d. Requirements for credentialing, privileging, and reprivileging that focus on the difference in types of care provided by midwives and physicians.
One of the ACNM principles for credentialing and privileging CNMs and CMs is that requirements for credentialing, privileging, and reprivileging should be equivalent.

39. c. standard of care.
Standards of care, also called practice guidelines, are evidence based, continuously evolving standards of appropriate care; sources include entities such as the CDC, Agency for Healthcare Research and Quality (AHRQ), and professional medical and nursing specialty organizations.

40. a. generalization.
Generalization extends the implications of the findings of a study from the sample studied to a large population or from a situation studied to a larger situation.
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