EXAM CRAM

NCLEX-RN®

Fourth Edition

WILDA RINEHART
DIANN SLOAN
CLARA HURD

PEARSON IT CERTIFICATION

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NCLEX-RN® Exam Cram, Fourth Edition

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Contents at a Glance

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About the Authors

Wilda Rinehart received an Associate Degree in Nursing from Northeast Mississippi Community College in Booneville, Mississippi. After working as a staff nurse and charge nurse, she became a public health nurse and served in that capacity for a number of years. In 1975, she received her nurse practitioner certification in the area of obstetrics-gynecology from the University of Mississippi Medical Center in Jackson, Mississippi. In 1979, she completed her Bachelor of Science degree in Nursing from Mississippi University for Women. In 1980, she completed her Master of Science degree in Nursing from the same university and accepted a faculty position at Northeast Mississippi Community College, where she taught medical-surgical nursing and maternal-newborn nursing. In 1982, she founded Rinehart and Associates Nursing Consultants. For the past 26 years, she and her associates have worked with nursing graduates and schools of nursing to assist graduates to pass the National Council Licensure Exam for Nursing. She has also worked as a curriculum consultant with faculty to improve test construction. Ms. Rinehart has served as a convention speaker throughout the southeastern United States and as a reviewer of medical-surgical and obstetric texts. She has co-authored materials used in seminars presented by Rinehart and Associates Nursing Review. As the president of Rinehart and Associates, she serves as the coordinator of a company dedicated to improving the quality of health through nursing education.

Dr. Diann Sloan received an Associate Degree in Nursing from Northeast Mississippi Community College, a Bachelor of Science degree in Nursing from the University of Mississippi, and a Master of Science degree in Nursing from Mississippi University for Women. In addition to her nursing degrees, she holds a Master of Science in Counseling Psychology from Georgia State University and a Doctor of Philosophy in Counselor Education, with minors in both Psychology and Educational Psychology, from Mississippi State University. She has completed additional graduate studies in healthcare administration at Western New England College and the University of Mississippi. Dr. Sloan has taught pediatric nursing, psychiatric mental health nursing, and medical surgical nursing in both associate degree and baccalaureate nursing programs. As a member of Rinehart and Associates Nursing Review, Dr. Sloan has conducted test construction workshops for faculty and nursing review seminars for both registered and practical nurse graduates. She has co-authored materials used in the item-writing workshops for nursing faculty and Rinehart and Associates Nursing Review. She is a member of Sigma Theta Tau nursing honor society.

Clara Hurd received an Associate Degree in Nursing from Northeast Mississippi Community College in Booneville, Mississippi (1975). Her experiences in nursing are clinically based, having served as a staff nurse in medical-surgical nursing. She has worked as an oncology, intensive care, orthopedic, neurological, and pediatric nurse. She received her Bachelor of Science degree in Nursing from the University of North Alabama in Florence, Alabama, and her Master of Science degree in Nursing from the Mississippi University for Women in Columbus, Mississippi. Ms. Hurd is a certified nurse educator. She currently serves as a nurse educator consultant and an independent contractor. Ms. Hurd has taught in both associate degree and baccalaureate degree nursing programs. She was a faculty member of Mississippi University for Women; Austin Peay State University in Clarksville, Tennessee; Tennessee State University in Nashville, Tennessee; and Northeast Mississippi Community College. Ms. Hurd joined Rinehart and Associates in 1993. She has worked with students in preparing for the National Council Licensure Exam and with faculty as a consultant in writing test items. Ms. Hurd has also been a presenter at nursing conventions on various topics, including item-writing for nursing faculty. Her primary professional goal is to prepare the student and graduate for excellence in the delivery of healthcare.

About the Technical Editors

Crystal Berry has B.S.N., R.N., and C.N.M.L. degrees and graduated from the University of North Carolina Wilmington with a bachelor's degree in Nursing. She worked for five years as a burn nurse at the North Carolina Jaycee Burn Center at UNC Hospitals in Chapel Hill, N.C. before becoming a PACU nurse. She is currently working at WakeMed Cary Hospital in Cary, N.C. as a nurse manager of Day Surgery, PACU, and Endoscopy.

Steven M. Picray is a medical surgical registered nurse in a major metropolitan hospital. He has also been a Baptist pastor and a computer programmer. He has a bachelor's and master's degrees in Theology, a B.S.N., and is currently pursuing his master's degree in nursing to become a nurse practitioner.

Dedication

We would like to thank our families for tolerating our late nights and long hours. Also, thanks to Gene Sloan for his help without pay. Special thanks to all the graduates who have attended Rinehart and Associates Review Seminars. Thanks for allowing us to be a part of your success.

Acknowledgments

Our special thanks to our editors, support staff, and nurse reviewers for helping us to organize our thoughts and experiences into a text for students and practicing professionals. You made the task before us challenging and enjoyable.

We Want to Hear from You!

As the reader of this book, *you* are our most important critic and commentator. We value your opinion and want to know what we're doing right, what we could do better, what areas you'd like to see us publish in, and any other words of wisdom you're willing to pass our way.

We welcome your comments. You can email or write to let us know what you did or didn't like about this book—as well as what we can do to make our books better.

Please note that we cannot help you with technical problems related to the topic of this book.

When you write, please be sure to include this book's title and author as well as your name and email address. We will carefully review your comments and share them with the author and editors who worked on the book

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Introduction

Welcome to the NCLEX-RN® Exam Cram

Often when we are studying for a very important exam such as the NCLEX®, we feel overwhelmed by the amount of content there is to master. This book will help you organize your knowledge and get ready to take and pass the Licensure Exam for Registered Nurses. This introduction discusses the NCLEX® exam in general and how the *Exam Cram* can help you prepare for the test. It doesn't matter whether this is the first time you're going to take the exam or if you have taken it previously; this book gives you the necessary information and techniques to obtain licensure.

Exam Cram books help you understand and appreciate the subjects and materials you need to pass. The books are aimed at test preparation and review. They do not teach you everything you need to know about the subject of nursing. Instead they present you with materials you are likely to encounter on the exam. Using a simple approach, we will help you understand the need-to-know information. First, you will learn medical-surgical content, psychiatric content, obstetric content, and pediatric content, with an emphasis on pharmacology, skills, and treatment of these disorders. In a well-organized format, you will learn the pathophysiology of the most common problems affecting clients, the treatment of these disorders, and the nursing care.

The NCLEX-RN® consists of questions from the cognitive levels of knowledge, comprehension, application, and analysis. The majority of questions are written at the application and analysis levels. Questions incorporate the five stages of the nursing process (assessment, diagnosis, planning, implementation, and evaluation) and the four categories of client needs. Client needs are divided into subcategories that define the content within each of the four major categories. These categories and subcategories are

- Safe, effective care environment:
  - Management of care: 17–23%
  - Safety and infection control: 9–15%
- Health promotion and maintenance: 6%–12%
- Psychosocial integrity: 6%–12%

- Physiological integrity:
  - Basic care and comfort: 6%–12%
  - Pharmacological and parenteral therapy: 12%–18%
  - Reduction of risk: 9%–15%
  - Physiological adaptation: 11%–17%

Taking the Computerized Adaptive Test

Computerized Adaptive Testing offers the candidate several advantages. The graduate can schedule the exam at a time that is convenient for him. The Pearson VUE Testing group is responsible for administering the exam. Because you might not be familiar with the Pearson testing centers, we recommend that you arrive at least 30 minutes early. If you are late, you will not be allowed to test. Bring two forms of identification with you, one of which must be a picture ID. Be sure that your form of identification matches your application. You will be photographed and fingerprinted on entering the testing site, so don't let this increase your stress. The allotted time is six hours. The candidate can receive results within approximately seven days (in some states even sooner). Remember that the exam is written at approximately the 10th-grade reading level, so keep a good dictionary handy during your studies.

The Cost of the Exam

The candidate wishing to write the licensure exam must fill out two applications: one to the National Council and one to the state in which she wants to be licensed. A separate fee must accompany each application. The fee required by the National Council is $200. State licensing fees vary from state to state. Licensure applications can be obtained on the National Council's website at www.ncsbn.org. Several states are members of the multistate licensure compact. This means that, if you are issued a multistate license, you pay only one fee. This information can be obtained by visiting the National Council's website as well.

How to Prepare for the Exam

Judicious use of this book, either alone or with other books such as the *NCLEX® Exam Prep* book by the same authors, and a review seminar such as the one provided by Rinehart and Associates, will help you achieve your goal of becoming a registered nurse. As you review for the NCLEX® Exam, we suggest that you find a location where you can concentrate on the material each day. A minimum of two hours per day for at least two weeks is suggested. We

have provided you with exam alerts, tips, notes, and sample questions—both multiple-choice and alternative items. These questions will acquaint you with the types of questions you will see during the exam. We have also formulated a mock exam with those difficult management and delegation questions that you can score to determine your readiness to test. Pay particular attention to the exam alerts and the Cram Sheet. Using them will help you gain and retain knowledge and reduce your stress as you prepare to test.

How to Use This Book

Each topical *Exam Cram* chapter follows a regular structure, along with cues about important or useful information. Here's the structure of a typical chapter:

- **Opening hotlists**—Each chapter begins with a list of terms and concepts you must learn and understand before you can know the subject matter. The hotlists are followed by an introductory section that sets the stage for the rest of the chapter.
- **Topical coverage**—After the opening hotlists, each chapter covers a series of topics related to the chapter's subject title. Throughout this section, we highlight topics or concepts that are likely to appear in the exam.

Even though the book is structured to the exam, these flagged items are often particularly important:

- **Exam alerts**—An exam alert stresses concepts, terms, or activities that are likely to relate to one or more test questions. For that reason, we think any information in an alert is worthy of unusual attentiveness on your part. A special exam alert layout is used like this:

EXAM ALERT

This is what an exam alert looks like. Remember to pay particular attention to these items!

- **Notes**—Throughout each chapter, additional information is provided that, although not directly related to the exam itself, is still useful and will aid your preparation. A sample note is shown here:

NOTE

This is how notes are formatted. Notes direct your attention to important pieces of information that relate to nursing and nursing certification.

- **Tips**—A tip might tell you another way of accomplishing something in a more efficient or time-saving manner. An example of a tip is shown here:

TIP

This is how tips are formatted. Keep your eyes open for these, and you'll learn some interesting nursing tips!

- **Exam prep questions**—Although we talk about test questions and topics throughout the book, the section at the end of each chapter presents a series of mock test questions and explanations of both correct and incorrect answers.
- **Practice exams**—Practice Exam I and Practice Exam II provide additional practice questions. Use these to gauge your learning and to build the confidence needed to move forward to the real exam.
- **Glossary**—At the end of the book you will find a glossary that defines critical nursing terms we cover in this book.
- **CD**—The CD includes a testing engine with many practice questions that you should use repeatedly to practice your test-taking skills and to measure your level of learning. You should be able to correctly answer more than 90% of the questions on the practice tests before taking the real exam.
- **Cram Sheet**—At the very beginning of the book is a tear card we call the Cram Sheet. This is a helpful tool that gives you distilled, compressed facts. It is a great tool for last-minute study and review.

About the Book

The topics in this book have been structured using the systems approach to nursing. We believe that the simple way to learn the disease process, treatments, and diagnostic studies is the best way. You will review material from each system and the related skills, diagnostics, diets, and so on with each system as we move through the content. You will also consider cultural and religious concerns when caring for the client experiencing threats or deprivations.

Aside from being a test preparation book, this book is also useful if you are brushing up on your nursing knowledge. It is an excellent quick reference for the licensed nurse.

Contact the Authors

The authors of this text are interested in you and want you to pass on the first attempt. If, after reviewing with this text, you would like to contact the authors, you can do so at Rinehart and Associates, PO Box 124, Booneville, MS 38829 or by visiting our website at www.nclexreview.net.

Self-Assessment

Before you take the exam, you might have some concerns, such as

- Am I required to answer all 265 questions to pass?

  No. If you run out of time, the computer looks at the last portion of the exam and determines whether you are consistently above or below the pass point.

- What score do I have to make to pass the NCLEX-RN® Exam?

  There is not a set score. When you were in nursing school, you might have been required to score 75% or 80% to pass and progress onto the next level. The licensure exam is not scored in percentages. The computer is looking for consistency above or below the pass point. When the candidate shows this consistency, the computer stops asking questions.

- How do they develop the test plan?

  Every three years a survey is sent out to 4,000 newly licensed nurses. These nurses are asked questions based on the "Activity Statement" for nursing practice. Based on the results of the survey, the test plan is set by the National Council and members of the Licensure Committee. These members are appointed from representative states.

- What types of questions will I be asked?

  The majority of questions are multiple-choice. A small number of the questions may be *alternative items*. These items are identify picture, put on ear phones and identify sound such as breath sounds, identify grafts, fill-in-the-blanks, identify-a-diagram, place-in-sequence, or check-all-that-apply questions. Some examples of alternative items are:

  - Figure the 8-hour intake and output.
  - Identify the area where the mitral valve is heard the loudest.
  - Place in sequence the tasks you would use in the skill of washing your hands.
  - Work the math problem.
  - Check all that apply to the care of the client after a cardiac catheterization.

- Will I have a calculator for math problems?

  Yes, a drop-down calculator is provided.

- Will I have something to write on in the testing area?

  Yes, a dry erase board or paper will be provided. Don't worry about the test givers thinking that you are cheating. They clean and secure the area after each candidate.

- What if I get sick and cannot take my exam?

  You have a period of time allowed during which you can cancel your appointment and reschedule. If, however, you do not contact the Pearson VUE group in that allotted time and do not attend to take the exam, you forfeit your money and have to reapply.

- Can I carry a purse or bag into the testing center?

  No, there will be lockers for your use in the testing center. (Also, dress warmly because the area is usually cool.) Any suspicious behavior can cause you to forfeit the opportunity to complete your test so be sure to leave any paper or notes in your car.

- Can I take breaks?

  Yes, there are optional breaks throughout the test.

- If I should fail, when could I retest?

  The required time to wait before you can rewrite is 45 days in most states; however, some states require that you wait 90 days. Should you be unsuccessful, you should contact the state where you want to obtain licensure for its required retest time.

Testing Your Exam Readiness

First and foremost, you obviously must have completed or be very close to completing your RN classes at the college level. The better you did in your college work, the better your chances are of doing well on this exam. However, there are no guarantees on the NCLEX-RN® exam, so you should prepare specifically for this exam using your college class work as a foundation.

Whether you attend a formal review seminar or use written material such as this book, or a combination of both, preparation is essential. Costing as much as $400 a try—pass or fail—you want to do everything you can to pass on your first attempt. Spend time each day studying and taking exam questions. The more questions you take, the more prepared you will be. I recommend that you score at least 90% on our practice questions consistently before you attempt to take the exam. With these facts in mind, let's get ready to take the NCLEX-RN® exam. Good luck!

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CHAPTER THREE

Caring for the Client with Disorders of the Respiratory System

Terms you'll need to understand

- ✓ Acute respiratory failure
- ✓ Apnea
- ✓ Asthma
- ✓ Atelectasis
- ✓ Bronchitis
- ✓ Continuous positive airway pressure (CPAP)
- ✓ Cor pulmonale
- ✓ Cyanosis
- ✓ Dyspnea
- ✓ Emphysema
- ✓ Empyema
- ✓ Hemoptysis
- ✓ Hypoxemia
- ✓ Hypoxia
- ✓ Pleural effusion
- ✓ Pleurisy
- ✓ Pneumonia
- ✓ Pulmonary embolus
- ✓ Tachypnea

Nursing skills you'll need to master

- ✓ Assessing breath sounds
- ✓ Providing tracheostomy care
- ✓ Collecting sputum
- ✓ Teaching proper use of an inhaler (MDI and DPI)
- ✓ Performing chest physiotherapy
- ✓ Assisting with thoracentesis
- ✓ Obtaining a throat culture
- ✓ Performing venipuncture
- ✓ Administering medication
- ✓ Managing chest drainage system
- ✓ Maintaining oxygen therapy
- ✓ Maintaining assisted ventilation

Chronic Obstructive Pulmonary Disease

Chronic obstructive pulmonary disease (COPD) exists when prolonged disease or injury has made the lungs less capable of meeting the body's oxygen needs. Examples of COPD include chronic bronchitis, emphysema, and asthma.

Chronic Bronchitis

Chronic bronchitis, an inflammation of the bronchi and bronchioles, is caused by continuous exposure to infection and non-infectious irritants, such as cigarette smoke. The condition is most common in those ages 40 to 55. Chronic bronchitis may be reversed with the removal of noxious irritants, although it is often complicated by chronic lung infections. These infections, which are characterized by a productive cough and dyspnea, can progress to right-sided heart failure and pulmonary hypertension. Chronic bronchitis and emphysema have similar symptoms that require similar interventions.

Emphysema

Emphysema is the irreversible overdistention of the airspaces of the lungs, which results in destruction of the alveolar walls. Clients with emphysema are classified as *pink puffers* or *blue bloaters*. Pink puffers may complain of exertional dyspnea without cyanosis. Blue bloaters develop chronic hypoxia, cyanosis, polycythemia, cor pulmonale, pulmonary edema, and eventually respiratory failure.

Physical assessment reveals the presence of a barrel chest, use of accessory muscles, coughing with the production of thick mucoid sputum, prolonged expiratory phase with grunting respirations, peripheral cyanosis, and digital clubbing.

In identifying emphysema, a chest x-ray reveals hyperinflation of the lungs with flattened diaphragm. Pulmonary studies show that the residual volume is increased while vital capacity is decreased. Arterial blood gases reveal hypoxemia.

Many symptoms of chronic bronchitis and emphysema are the same; therefore, medications for the client with chronic bronchitis and emphysema include bronchodilators, steroids, antibiotics, and expectorants. Oxygen should be administered via nasal cannula at 2–3 liters/minute. Close attention should be given to correcting acid-base imbalances, meeting the client's nutritional needs, avoidance of respiratory irritants, prevention of respiratory infections, providing oral hygiene, and client teaching regarding medications.

CAUTION

When administering antibiotics, a separate IV line should be established for the administration of aminophylline—a bronchodilator—because incompatibilities can exist with some antibiotics and the administration of a bronchodilator. If only one access is established, the SAS (saline, administer drug, saline) procedure should be used.

The client receiving aminophylline should be placed on cardiorespiratory monitoring because aminophylline affects heart rate, respiratory rate, and blood pressure. In this scenario, toxicity can occur rapidly. Toxic symptoms include nausea, vomiting, tachycardia, palpitations, hypotension, shock, coma, and death.

The therapeutic range for aminophylline is as follows: 10–20 mcg/mL.

Asthma

Asthma is the most common respiratory condition of childhood. *Intrinsic (nonallergenic) asthma* is precipitated by exposure to cold temperatures or infection. *Extrinsic (allergenic or atopic) asthma* is often associated with childhood eczema. Both asthma and eczema are triggered by allergies to certain foods or food additives. Introducing new foods to the infant one at a time helps decrease the development of these allergic responses. Easily digested, hypoallergenic foods and juices should be introduced first, including rice cereal and apple juice, which may be given at six months of age. Cow's milk should not be given to the infant before one year of age. Symptoms of asthma include expiratory wheeze; shortness of breath; and a dry, hacking cough, which eventually produces thick, white, tenacious sputum. In some instances an attack may progress to status asthmaticus, leading to respiratory collapse and death.

Management of the client with asthma includes maintenance therapy with mast cell stabilizers and leukotriene modifiers. Treatment of acute asthmatic attacks includes the administration of oral or inhaled short-term or long-term B2 agonist and anti-inflammatories as well as supplemental oxygen. Methylxanthines, such as aminophylline, are rarely used for the treatment of asthma. These drugs, which can cause tachycardia and dysrhythmias, are administered as a last resort. Antibiotics are frequently ordered when a respiratory infection is present.

Acute Respiratory Infections

Acute respiratory infections, such as pneumonia, are among the most common causes of death from infectious diseases in the United States. Pneumonia is a major cause of death in persons over age 65.

Pneumonia

Pneumonia is an inflammation of the parenchyma of the lungs. Causative organisms include bacteria, viruses, and fungi. Some of these organisms are listed here:

- Pneumococcus
- Group A beta hemolytic streptococcus
- Staphylococcus
- Pseudomonas
- Influenza types A and B
- Cytomegalovirus
- Aspergillus fungiatus
- Pneumocystis carinii

Presenting symptoms depend on the causative organism. The client with viral pneumonia tends to have milder symptoms, whereas the client with bacterial pneumonia might have chills and fever as high as 103°. Clients with cytomegalovirus, pneumocystis carinii, or aspergillus will be acutely ill. General symptoms of pneumonia include

- Hypoxia
- Tachypnea
- Tachycardia
- Chest pain
- Malaise
- Fever
- Confusion (especially in the elderly client)

Care of the client with pneumonia depends on the causative organism. The management of bacterial pneumonias includes antibiotics, antitussives, antipyretics, and oxygen. Antibiotics that may be ordered include penicillin G, tetracycline, garamycin, and erythromycin. Viral pneumonias do not respond to antimicrobial therapy, but are treated with antiviral medication such as Symmetrel (amantadine). Fungal pneumonias are treated with antifungal medication such as Nizoral (ketoconozole). Additional therapies for the client with pneumonia include providing for fluid and nutritional needs, obtaining frequent vital signs, and providing oral hygiene. Supplemental oxygen and chest percussion and drainage should be performed as ordered by the physician

CAUTION

Some medications used in the treatment of pneumonia require special attention:

- **Tetracycline**—Should not be given to women who are pregnant or to small children because of the damage it can cause to developing teeth and bones.
- **Garamycin**—An aminoglycoside, it is both ototoxic and nephrotoxic. It is important to monitor the client for signs of toxicity. Serum peak and trough levels are obtained according to hospital protocol.

Peak levels for aminoglycosides are drawn 30 minutes after the third or fourth IV infusion. Trough levels for aminoglycosides are drawn 30 minutes before the third or fourth IV infusion. The therapeutic range for garamycin is 4–10 mcg/mL.

Pleurisy

Pleurisy, an inflammation of the pleural sac, can be associated with upper respiratory infection, pulmonary embolus, thoracotomy, chest trauma, or cancer. Symptoms include

- Sharp pain on inspiration
- Chills
- Fever
- Cough
- Dyspnea

Chest x-ray reveals the presence of air or fluid in the pleural sac. Management of the client with pleurisy includes the administration of analgesics, antitussives, antibiotics, and oxygen therapy. The presence of pleural effusion can require the client to have a thoracentesis. It is the nurse's responsibility to position the client for the procedure and to monitor for signs of complications related to the procedure. The nurse should assess the client's vital signs, particularly changes in respirations and blood pressure, which can reflect impending shock from fluid loss or bleeding. The nurse should also observe the client for signs of a pneumothorax.

Nursing Skill: Positioning the client for a thoracentesis

- Sitting on the edge of the bed with feet supported and with the head and arms resting on a padded over bed table)
- Sitting astride a chair with the arms and head resting on the back of the chair
- Lying on the unaffected side with the head of the bed elevated 30 to 45 degrees (for clients unable to sit upright)

Tuberculosis

Tuberculosis (TB) is a highly contagious respiratory infection caused by the mycobacterium tuberculosis. It is transmitted by droplets from the respiratory tract. Airborne precautions, as outlined by the Centers for Disease Control (CDC), should be used when caring for the client with tuberculosis.

NOTE

Standard precautions and transmission-based precautions are provided in Appendix A, "Things You Forgot," which is on the CD.

Diagnosis includes the administration of the Mantoux skin test, sometimes referred to as the Purified Protein Derivative (PPD), which is read in 48–72 hours. The presence of a positive Mantoux test indicates exposure to TB but not active infection. A chest x-ray should be ordered for those with a prior positive skin test. A definite diagnosis of TB is made if the sputum specimen is positive for the tubercle bacillus. Factors that can cause a false positive TB skin test include nontuberculous mycobacterium and inoculation with BCG vaccine. Factors that can cause a false negative TB skin test include anergy (a weakened immune system), recent TB infection, age, vaccination with live viruses, overwhelming TB, and poor testing technique. Management of the client with TB includes the use of ultraviolet light therapy and the administration of antimycobacterial drugs. Medication regimens can consist of several drugs including Myambutol (ethambutol), INH (isoniazid), Rifadin (rifampin), and PZA (pyrazinamide). The use of multiple drug therapy has reduced treatment time from two years to as little as six months; however, drug resistant forms may require longer treatment periods. Clients are no longer considered infectious after three negative sputum samples have been obtained. Surgical management may include a wedge resection or lobectomy.

Influenza

Influenza is an acute highly contagious infection that primarily affects the upper respiratory tract and is sometimes complicated by the development of pneumonia. Influenza is caused by one of three types of *Myxovirus influenzae*. Infection with one strain produces immunity to only that strain: therefore, annual immunization is needed to protect against the strain projected to be prevalent that year. Symptoms of influenza include the following:

- Chills and fever greater than 102° F.
- Sore throat and laryngitis
- Runny nose
- Muscle aches and headache

Complications of influenza include pneumonia, exacerbations of Chronic Obstructive Pulmonary Disease (COPD), and myositis. More serious complications include pericarditis and encephalitis. Children, the elderly, and those with chronic illness are more likely to develop severe complications; therefore, it is recommended that these clients receive annual immunization. The vaccine is given in the fall, prior to the onset of annual outbreaks, which occur in the winter months. The vaccine is produced in eggs; therefore, it should not be given to anyone who is allergic to egg protein. Children age two and older can receive the nasal vaccine as well as adults.

Treatment of influenza is aimed at controlling symptoms and preventing complications. Interventions for the client with influenza include bed rest, increased fluid intake, decongestant nasal sprays, antitussives with codeine, and antipyretics. Antibiotics are indicated if the client develops bacterial pneumonia. Antiviral medication such as Relenza (zanamivir) and Tamiflu (oseltamivir) are used for the prevention as well as the treatment of influenza A and B and can be used to reduce the duration and severity of symptoms. Symmetrel (amantadine) or Flumadine (rimantadine) are also used to prevent or decrease symptoms of the flu.

Acute Respiratory Failure

Acute respiratory failure can be defined as the lungs' failure to meet the body's oxygen requirements. One acute respiratory condition you need to be familiar with is acute respiratory distress syndrome, commonly known as ARDS.

Acute Respiratory Distress Syndrome

Acute respiratory distress syndrome, commonly known as *ARDS* or *noncardiogenic pulmonary edema*, occurs mostly in otherwise healthy persons. ARDS can be the result of anaphylaxis, aspiration, pulmonary emboli, inhalation burn injury, or complications from abdominal or thoracic surgery. ARDS may be diagnosed by a chest x-ray that will reveal emphysematous changes and infiltrates that give the lungs a characteristic appearance described as ground glass. Assessment of the client with ARDS reveals

- Hypoxia
- Sternal and costal retractions
- Presence of rales or rhonchi
- Diminished breath sounds
- Refractory hypoxemia

Care of the client with ARDS involves

- Use of assisted ventilation
- Monitoring of arterial blood gases

- Attention to nutritional needs
- Frequent change in position, placement in high Fowler's position, prone position, or use of specialized beds to minimize consolidation of infiltrates in large airways
- Investigational therapies, including the use of vitamins C and E, aspirin, interleukin, and surfactant replacements

Pulmonary Embolus

Pulmonary embolus refers to the obstruction of the pulmonary artery or one of its branches by a clot or some other undissolved matter, such as fat or a gaseous substance. Clots can originate anywhere in the body but are most likely to migrate from a vein deep in the legs, pelvis, kidney, or arms. *Fat emboli* are associated with fractures of the long bones, particularly the femur. *Air emboli*, which are less common, can occur during the insertion or removal of a central line. Common risk factors for the development of pulmonary embolus include immobilization, fractures, trauma, cigarette smoking, use of oral contraceptives, and history of clot formation.

TIP

Remember the three Fs associated with fat emboli:

- Fat
- Femur
- Football player

Fat emboli are associated with fractures of long bones (such as a fractured femur); most fractured femurs occur in young men 18–25, the age of most football players.

Symptoms of a pulmonary embolus depend on the size and location of the clot or undissolved matter. Symptoms include

- Chest pain
- Dyspnea
- Syncope
- Hemoptysis
- Tachycardia
- Hypotension
- Sense of apprehension

- Petechiae over the chest and axilla
- Distended neck veins

Diagnostic tests to confirm the presence of pulmonary embolus include chest x-ray, pulmonary angiography, lung scan, and ECG to rule out myocardial infarction. Management of the client with a pulmonary embolus includes

- Placing the client in high Fowler's position
- Administering oxygen via mask
- Giving medication for chest pain
- Using thrombolytics/anticoagulants

Antibiotics are indicated for those with septic emboli. Surgical management using umbrella-type filters is indicated for those who cannot take anticoagulants as well as for the client who has recurrent emboli while taking anticoagulants. Clients receiving anticoagulant therapy should be observed for signs of bleeding. PT, INR, and PTT are three tests used to track the client's clotting time. You can refer to Chapter 13, "Caring for the Client with Disorders of the Cardiovascular System," for a more complete discussion of these tests.

CAUTION

Streptokinase is made from beta strep; therefore, clients with a history of strep infections may respond poorly to anticoagulant therapy with streptokinase because they might have formed antibodies.

Streptokinase is not clot specific; therefore, the client may develop a tendency to bleed from incision or injection sites.

Emerging Infections

The CDC (1994) defines *emerging infections* as diseases of infectious origin with human incidences occurring within the past two decades. Emerging illnesses are likely to increase in incidence in the near future. Two respiratory conditions listed as emerging infections are Severe Acute Respiratory Syndrome (SARS) and Legionnaire's disease.

Severe Acute Respiratory Syndrome

Severe Acute Respiratory Syndrome (SARS) is caused by a coronavirus. Symptoms include

- Fever
- Dry cough

- Hypoxemia
- Pneumonia

In identifying SARS, a chest x-ray reveals "ground glass" infiltrates with bilateral consolidation occurring sometimes within 24–48 hours, thus suggesting the rapid development of acute respiratory failure. SARS was first reported in Asia in February 2003. The disease spread to more than two dozen countries in Europe, Asia, North America, and South America before being contained in that same year. A history of recent travel is significant in the client's history.

The SARS virus can be found in nasopharyngeal and oropharyngeal secretions, blood, and stool. Diagnostic tests for SARS include

- Sputum cultures for Influenza A, B, and RSV
- Serum tests to detect antibodies IgM and IgG
- Reverse transcriptase polymerase chain reaction tests performed to detect RNA of SARS CoV

Two tests on two different specimens must be positive to confirm the diagnosis. Test results are considered negative if no SARS CoV antibodies are found 28 days after the onset of symptoms.

The client suspected of having SARS should be cared for using airborne and contact precautions. Management includes the use of antibiotics to treat secondary or atypical pneumonia. Antivirals or retrovirals can be used to inhibit replication. Respiratory support, closed system for suctioning, and the use of surfactant replacement may be ordered.

Legionnaire's Disease

Legionnaire's disease is caused by gram negative bacteria found in both natural and manmade water sources. Bacterial growth is greater in stored water maintained at temperatures ranging from 77° to 107° F. Risk factors include

- Immunosuppression
- Diabetes
- Pulmonary disease

Legionnaire's involves the lungs and other organs. The symptoms include

- Productive cough
- Dyspnea

- Chest pain
- Diarrhea
- Fever

Diagnostic tests include a urinary antigen test that remains positive after initial antibiotic therapy. Management includes the use of antibiotics, oxygen, provision of nutrition, and hydration. The drug of choice for treating Legionnaire's disease is Zithromax (azithromycin). Transmission-based precautions are not necessary when caring for the client with Legionnaire's disease because there is no indication of human-to-human transmission.

Diagnostic Tests for Review

These are simply some of the tests that are useful in diagnosing pulmonary disorders. You should review the normal lab values as well as any special preparations for the client undergoing those tests. In addition, think about the care given to clients after the procedures have been completed. For instance, the client who has undergone a bronchoscopy will have a depressed gag reflex, which increases the chance of aspiration. No food or fluid should be given until the gag reflex returns. The tests for diagnosing pulmonary disorders are as follows:

- CBC
- Chest x-ray
- Pulmonary function tests
- Lung scan
- Bronchoscopy

Pharmacology Categories for Review

The client with a respiratory disorder should be managed with several categories of medications. The client with an acute respiratory condition, such as bacterial pneumonia, is given an antibiotic to fight the infection, antipyretic medication for fever and body aches, and an antitussive for relief of cough. The client with a chronic respiratory condition may receive many of the same medications, with the addition of a steroid or bronchodilator. The following list contains the most commonly prescribed categories of medications used to treat clients with respiratory conditions:

- Antibiotics
- Antivirals

- Antituberculars
- Antitussives
- Antipyretics
- Bronchodilators
- Expectorants
- Leukotriene modifiers
- Mast-cell stabilizers
- Steroids

Exam Prep Questions

1. When performing an assessment on the client with emphysema, the nurse finds that the client has a barrel chest. The alteration in the client's chest is due to:

   - ❍ **A.** Collapse of distal alveoli
   - ❍ **B.** Hyperinflation of the lungs
   - ❍ **C.** Long-term chronic hypoxia
   - ❍ **D.** Use of accessory muscles

2. The nurse notes that a client with COPD demonstrates more dyspnea in certain positions. Which position is most likely to alleviate the client's dyspnea?

   - ❍ **A.** Lying supine with a single pillow
   - ❍ **B.** Standing or sitting upright
   - ❍ **C.** Side lying with the head elevated
   - ❍ **D.** Lying with head slightly lowered

3. When reviewing the chart of a client with long standing lung disease, the nurse should pay close attention to the results of which pulmonary function test?

   - ❍ **A.** Residual volume
   - ❍ **B.** Total lung capacity
   - ❍ **C.** FEV1/FVC ratio
   - ❍ **D.** Functional residual capacity

4. The physician has ordered O_2 at 3 liters/minute via nasal cannula. O_2 amounts greater than 3 liters / minute are contraindicated in the client with COPD because:

   - ❍ **A.** Higher concentrations result in severe headache.
   - ❍ **B.** Hypercapnic drive is necessary for breathing.
   - ❍ **C.** Higher levels will be required later to raise the pO_2.
   - ❍ **D.** Hypoxic drive is needed for breathing.

5. The client taking a bronchodilator tells the nurse that he is going to begin a smoking cessation program when he is discharged. The nurse should tell the client to notify the doctor if his smoking pattern changes because he will:

- ❍ **A.** Need his medication dosage adjusted
- ❍ **B.** Require an increase in antitussive medication
- ❍ **C.** No longer need annual influenza immunization
- ❍ **D.** Not derive as much benefit from inhaler use

6. Lab results indicate that the client's serum aminophylline level is 17mcg/mL. The nurse recognizes that the aminophylline level is:

- ❍ **A.** Within therapeutic range
- ❍ **B.** Too high and should be reported
- ❍ **C.** Questionable and should be repeated
- ❍ **D.** Too low to be therapeutic

7. The morning weight for a client with emphysema indicates that the client has gained 5 pounds in less than a week, even though his oral intake has been modest. The client's weight gain may reflect which associated complication of COPD?

- ❍ **A.** Polycythemia
- ❍ **B.** Cor pulmonale
- ❍ **C.** Left ventricular failure
- ❍ **D.** Compensated acidosis

8. The nurse is teaching the client the appropriate way to use a metered dose inhaler. Which action indicates the client needs additional teaching?

- ❍ **A.** The client takes a deep breath while depressing the inhaler.
- ❍ **B.** The client places the inhaler two fingers from the mouth.
- ❍ **C.** The client waits 15 seconds before using the inhaler a second time.
- ❍ **D.** The client exhales slowly using purse lipped breathing.

9. The client with COPD may lose weight despite having adequate caloric intake. When counseling the client in ways to maintain an optimal weight, the nurse should tell the client to:

- ❍ **A.** Continue the same caloric intake and increase the amount of fat intake
- ❍ **B.** Increase his activity level to stimulate his appetite
- ❍ **C.** Increase the amount of complex carbohydrates and decrease the amount of fat intake
- ❍ **D.** Decrease the amount of complex carbohydrates while increasing calories, protein, vitamins, and minerals

10. The client has been receiving garamycin 65 mg IVPB every 8 hours for the past 6 days. Which lab result indicates an adverse reaction to the medication?

- ❍ **A.** WBC 7500
- ❍ **B.** Serum glucose 92
- ❍ **C.** Protein 3.5
- ❍ **D.** Serum creatinine 2.0

Answer Rationales

1. Answer B is correct. Clients with emphysema develop a barrel chest due to the trapping of air in the lungs, causing them to hyperinflate. Answers C and D are common in those with emphysema but do not cause the chest to become barrel shaped. Answer A does not occur in emphysema.

2. Answer B is correct. The client with chronic obstructive pulmonary disease has increased difficulty breathing when lying down. His respiratory effort is improved by standing or sitting upright or by having the bed in high Fowler's position. Answers A, C, and D do not alleviate the client's dyspnea; therefore they are incorrect.

3. Answer C is correct. The FEV1/FVC ratio indicates disease progression. As COPD worsens, the ratio of FEV1 to FVC becomes smaller. Answers A and B reflect loss of elastic recoil due to narrowing and obstruction of the airway. Answer D is increased in clients with obstructive bronchitis.

4. Answer D is correct. In clients with COPD, respiratory effort is stimulated by hypoxemia. Answers A and C are incorrect because higher levels would rob the client of the drive to breathe. Answer B is an incorrect statement.

5. Answer A is correct. Changes in smoking patterns should be discussed with the physician because they have an impact on the amount of medication needed. Answer B is incorrect because clients with COPD are placed on expectorants, not antitussives. Answer C is incorrect because an annual influenza vaccine is recommended for all those with lung disease. Answer D is incorrect because benefits from inhaler use should be increased when the client stops smoking.

6. Answer A is correct. The therapeutic range for aminophylline is 10–20 mcg/ml. Answers B and D are incorrect. There are no indications that the results are questionable; therefore, repeating the test as offered by answer C is incorrect.
7. Answer B is correct. Cor pulmonale, or right sided heart failure, is a possible complication of emphysema. Answers A and D do not cause weight gain, so they're incorrect. Answer C would be reflected in pulmonary edema, so it's incorrect.
8. Answer C is correct. The client should wait 60 seconds before using the inhaler a second time. The client's wait time of 15 seconds indicates that the client needs further teaching. Answers A, B, and D indicate that the client understands the correct use of the inhaler.
9. Answer D. The client with COPD needs additional calories, protein, vitamins, and minerals. Answer A is incorrect because the client needs more calories but not more fat. Answer B is not feasible, will increase the O_2 demands, and will result in further weight loss. Answer C leads to excess acid production and an increased respiratory workload.
10. Answer D is correct. The serum creatinine is elevated, indicating renal impairment. Answers A, B, and C are within normal limits.

Suggested Reading and Resources

- Centers for Disease Control and Prevention: www.cdc.gov.
- American Lung Association: www.lungusa.org.
- The Pathology Guy: www.pathguy.com.
- Health24: www.health24.com.
- Ignatavicius, D., and Workman, S. *Medical Surgical Nursing: Patient Centered Collaborative Care*. 7th ed.
- Brunner, L., and Suddarth, D. *Textbook of Medical Surgical Nursing*. 12th ed. Philadelphia: Lippincott Williams & Wilkins, 2009.
- LeMone, P., and Burke, K. in *Medical Surgical Nursing: Critical Thinking in Client Care*. 5th ed. Upper Saddle River, NJ: Pearson Prentice Hall, 2011.
- Lewis, S., Heitkemper, M., Dirksen, S., O'Brien, P,. and Bucher, L. *Medical Surgical Nursing: Assessment and Management of Clinical Problems*. 8th ed. Philadelphia: Elsevier, 2011.
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