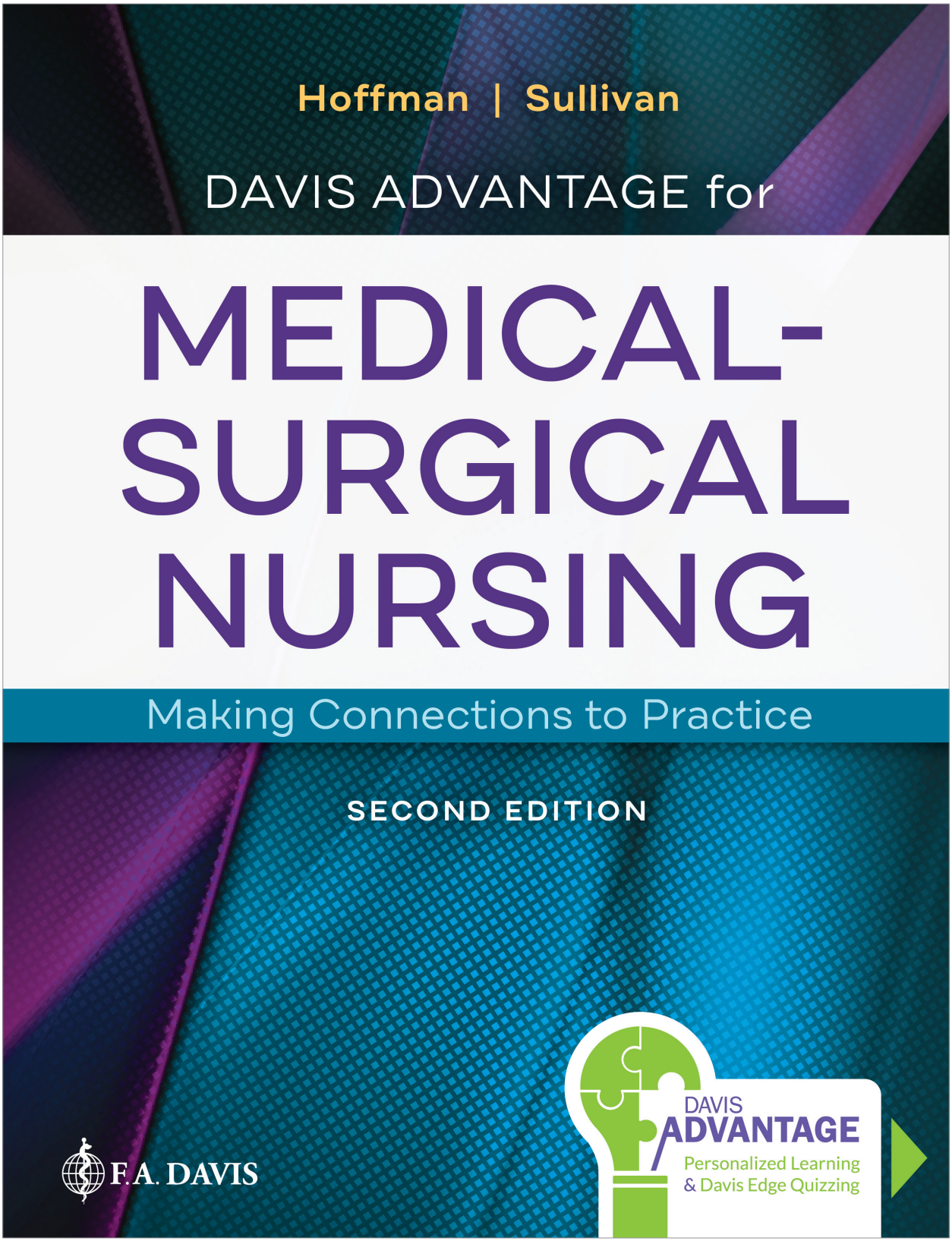
# Sneak Preview!



# Engaging Today's Student | Saving Instructors Time

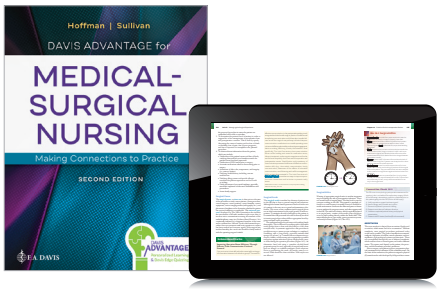



## Davis Advantage for MEDICAL-SURGICAL NURSING

**Redefining the way instructors teach and students learn**

## Your Complete Medical-Surgical Nursing Solution

### LEARNING




**Connecting concepts from the written word to the real world**

### APPLYING




**Personalized Learning**

### ASSESSING




**Personalized Quizzing**

## The Right Content + The Right Technology ensure student success.

**Over 53,000** students have used Davis Advantage and experienced success—see how your students can take an active role in their education and drive their own learning.

## Top benefits of using Davis Advantage

**1** Makes connections to key topics.

2. Improves student engagement.
3. Increases participation & collaboration.
4. Creates a hands-on, active classroom.
5. Makes teaching easier.

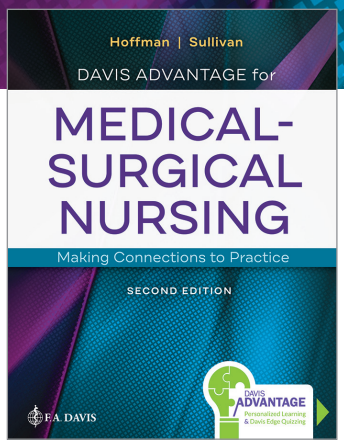
## CALL ON US

**Learn more.**
**Schedule a walkthrough.**
**Request preview access.**

800.323.3555 (US) or
800.665.1148 (CAN)

**Hello@FADavis.com**

**www.FADavis.com/MedSurg**







# LEARNING

## Connecting concepts from the written word to the real world

***Medical-Surgical Nursing, 2nd Edition*** helps you to make the connections between concepts and patient care to prepare you for real-world nursing practice.

# STEP #1 Build a solid foundation.

### LEARNING OUTCOMES

**Content in this chapter is designed to assist in:**

1. Describing the epidemiology of lower airway disorders
2. Correlating clinical manifestations to pathophysiological processes of:
   a. Asthma
   b. Chronic obstructive pulmonary disease
   c. Cystic fibrosis
   d. Lung cancer
3. Describing the diagnostic results used to confirm the diagnosis of lower air disorders
4. Discussing the medical management of:
   a. Asthma
   b. Chronic obstructive pulmonary disease
   c. Cystic fibrosis
   d. Lung cancer
5. Developing a comprehensive plan of nursing care for patients with lower airway disorders
6. rmacological, dietary, and lifes y diso

**Learning Outcomes** at the beginning of each chapter guide your reading and highlight the information you'll need to know, while **Connection Checks** throughout the chapters test how well you've mastered the material.

### Connection Check 26.2

What is the primary difference between emphysema and chronic bronchitis?

A. Chronic bronchitis predominately affects the large airways.
B. Emphysema predominately affects the large airways.
C. Emphysema predominately affects the alveoli.
D. Chronic bronchitis predominately affects the alveoli.

### Making Connections

#### CASE STUDY: WRAP-UP

Clifford continues to be short of breath and to wheeze. His $SpO_2$ remains acceptable while he receives oxygen via the nasal cannula. After the first three nebulizer treatments, his peak flow reading is repeated. It is slightly improved but not back to baseline. Clifford then receives Prednisone 60 mg intramuscularly (IM). The symptoms slowly begin to subside. A repeat of the peak flow reading reveals continued improvement. When Clifford's symptoms are fully resolved, he is discharged from the emergency department with a prescription for an oral prednisone taper. Before he leaves, hospital personnel ensure that he has an appointment with his primary care provider to review this hospital visit and update his asthma action plan.

***Case Study Questions***

1. What is the most important component of the medical management of Mr. Davis?
   A. Breathing techniques
   B. Disease management through education
   C. Use of "rescue" medications
   D. Use of a peak flow meter
2. If there are no wheezes and diminished breath sounds upon reassessment, what conclusion can the nurse make?
   A. Mr. Davis has resolved his respiratory condition.
   B. Mr. Davis has responded to the bronchodilator therapy.
   C. Mr. Davis has a partially obstructed airway.

### Finding Connections

#### CASE STUDY: EPISODE 1

*Follow this patient throughout the chapter.*

Clifford Davis is a 39-year-old male with a history of asthma who presents to the emergency department with shortness of breath and inability to carry on a conversation. He is assuming a tripod position and exhibits pursed-lip breathing. He has a nonproductive cough. He woke up coughing, followed by chest tightness, which prompted a call to the rescue services. His vital signs are blood pressure (BP), 121/65 mm Hg; heart rate (HR), 150 bpm; respiratory rate (RR), 40. He has audible wheezes bilaterally. He has been a one-pack/day smoker for 15 years.

**Finding Connections** are case studies that illustrate key points and bring the content to life. Follow each case study as it unfolds throughout the chapter to see how the theory you're learning applies to practice. Then, answer the critical-thinking questions at the end of **Making Connections Case Study: Wrap-Up.**

Uncorrected page proofs may vary upon publication.

**Safety Alert** If a patient with COPD experiencing an exacerbation is on oxygen therapy, $SpO_2$ and respiratory rate must be monitored continuously until the condition is stabilized. If the patient is receiving too much oxygen, it may "blunt" the respiratory drive. The respiratory effort in a patient with COPD is triggered by the decrease in oxygen, not an increase in carbon dioxide, which is different from the patient with healthy lungs. Therefore, too much oxygen and high $PaO_2$ and $SpO_2$ may cause a decreased respiratory effort.

**Safety Alerts** focus on potential hazardous or high-risk issues related to the specific chapter content.

**Nursing Management** provides clear and well-defined nursing care guidance to help you to understand the nurse's role. Begin with scientific explanations for presenting clinical manifestations, then follow the nursing process to prioritize care. For easy reference, **Nursing Interventions** are formatted into **Assessments**, **Actions**, and **Teaching** categories with bulleted rationales that explain the 'hows' and 'whys' of treatment.

DAVIS ADVANTAGE

To explore learning resources for this chapter, go to **Davis Advantage** and find...

- Answers to in-text questions
- Chapter Resources and Activities
- NCLEX®-Style Chapter Review Questions
- Bibliography

Additional learning resources and activities are available for every chapter on **Davis Advantage**.

## *Nursing Management*

### Assessment and Analysis

The clinical manifestations presented by the patient are due to increased airway resistance, increased work of breathing, and increased sputum production. They include:

- Cough
- Increased sputum production
- Dyspnea
- Use of accessory muscles
- Tripod positioning
- Inability to talk in full sentences
- Pursed-lip breathing
- Changes in skin coloring
- Anxiety

### Nursing Diagnoses

- **Impaired gas exchange** related to altered oxygen delivery and alveoli destruction
- **Ineffective airway clearance** related to decreased energy, dyspnea, ineffective cough
- **Activity intolerance** related to fatigue and dyspnea
- **Anxiety** related to breathlessness

### Nursing Interventions

#### *Assessments*

- Oxygen saturation
  *An $SpO_2$ of less than 90% indicates a significant oxygenation problem. The goal is to maintain the $SpO_2$ at 90% or above.*
- Respiratory rate
  *Monitor respiratory rate to avoid hypoventilation—the respiratory drive in COPD is hypoxemia, not hypercapnia. See Safety Alert.*
- Breath sounds
  *The presence of crackles and wheezes may indicate airway obstruction. Crackles indicate the premature closing of the airways.*
- Pursed-lip breathing
  *Patients with COPD display pursed-lip breathing to keep the airways open longer and prolong exhalation, allowing for increased time for oxygen and carbon dioxide exchange.*
- Cough
  *Cough is a cardinal sign of pulmonary disease. It is a protective mechanism for the tracheobronchial tree.*
- Temperature
  *Increased temperature is a sign of an infectious trigger.*
- Dyspnea
  *Use of the visual analog dyspnea scale allows the patient to identify his or her own level of dyspnea because dyspnea is a subjective experience.*
- Weight
  *Monitoring weight identifies nutritional deficiencies—with prolonged increased work of breathing and decreased energy, the ability to eat decreases.*

#### *Actions*

- Administer bronchodilators as ordered.
  *Bronchodilators are bronchial smooth muscle relaxants that help open the airway. $Beta_2$-agonists (short-acting beta-agonists [SABAs] and long-acting beta-agonists [LABAs]) relax the smooth muscles of the airway by stimulating beta-adrenergic receptors, resulting in antagonism to bronchoconstriction. Anticholinergics relax and enlarge the airways in the lungs, making breathing easier. Also, anticholinergics can also protect the airways from bronchospasm and may reduce the amount of mucus produced by the airways.*
- Provide oxygen.
  *Increase the $SpO_2$ to 90%. Patients may be placed on continuous oxygen therapy if the $SpO_2$ is less than or equal to 88% or the $PaO_2$ is less than or equal to 60 mm Hg.*
- Position—semi-Fowler's
  *The semi-Fowler's position increases oxygenation by allowing adequate lung expansion.*
- Provide small, frequent meals with dietary supplements.
  *Small, frequent meals take less energy to consume and avoid excessive pressure on the diaphragm that may be associated with a large meal.*

#### *Teaching*

- Breathing techniques—pursed-lip breathing (Box 26.3)
  *Pursed-lip breathing keeps the airways open longer and prolongs exhalation, allowing for increased time for oxygen and carbon dioxide exchange.*
- Pacing of activities
  *Pacing decreases the work of breathing and conserves energy.*





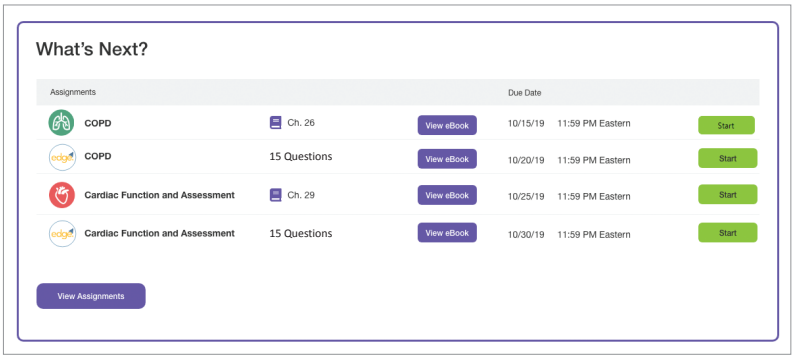


# APPLYING

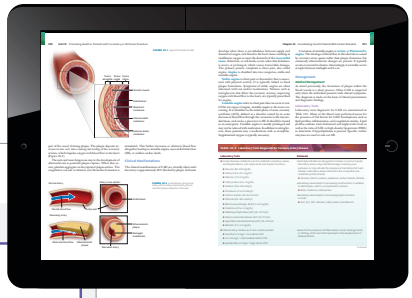
## A personalized learning experience tailored to your needs

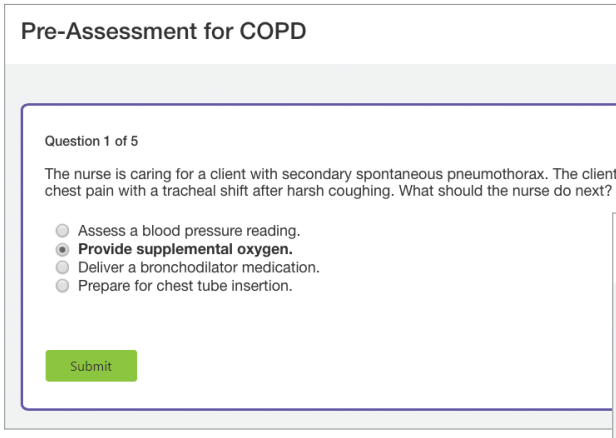
Put a study plan to work that's based on your strengths and weaknesses. Engaging, interactive content helps you make the connections and master key Med-Surg topics.

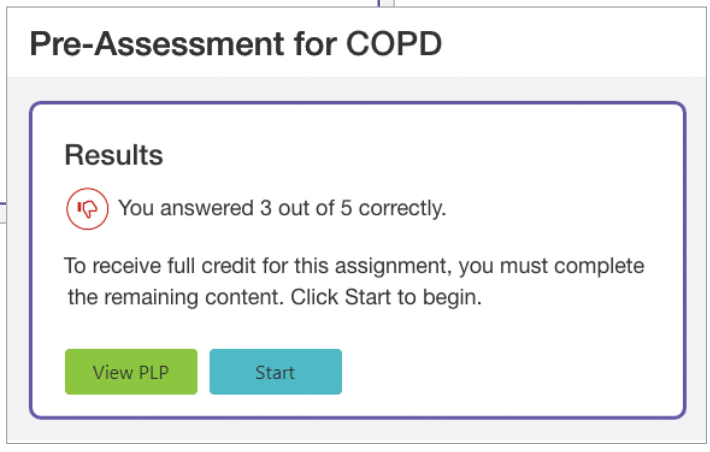
## STEP #2 Make the connections and apply your knowledge.



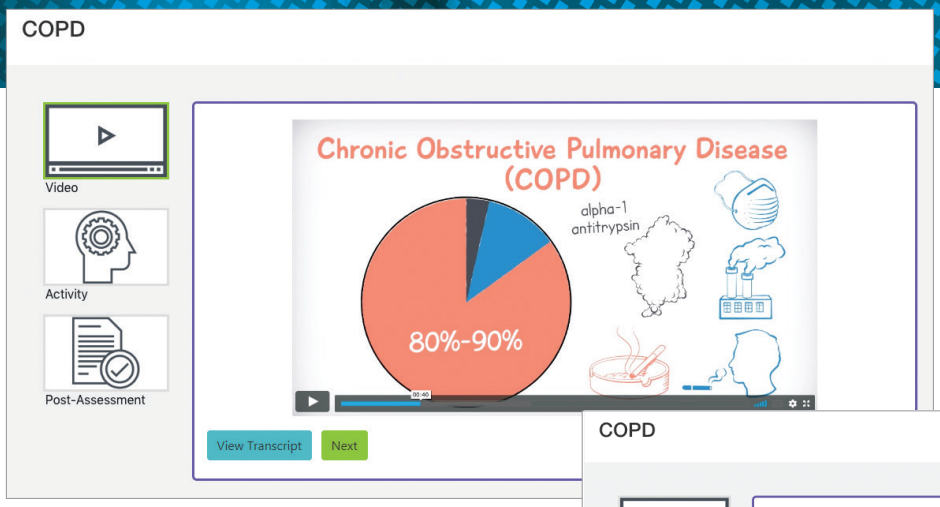

**Assignments** in Davis Advantage are mapped to a specific chapter in your book. Begin by reading from your printed text or click the ebook button to be taken to the chapter in your **FREE integrated ebook.**



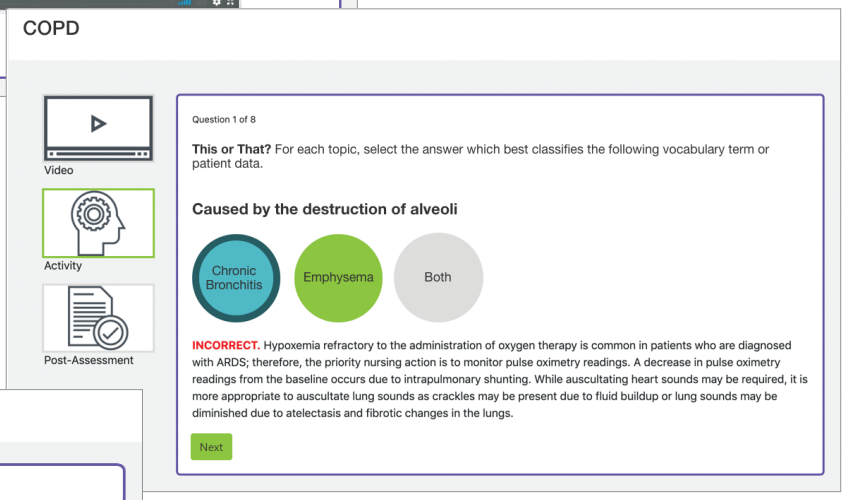


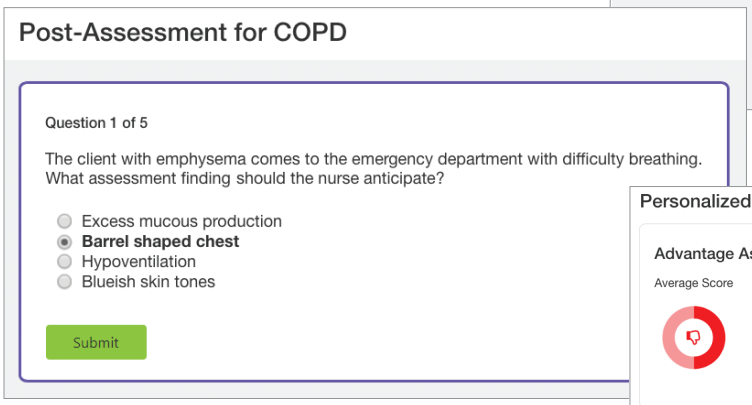

Following your reading, take the **Pre-Assessment** quiz to evaluate your understanding of the content. You'll receive **immediate feedback** that identifies your strengths and weaknesses.

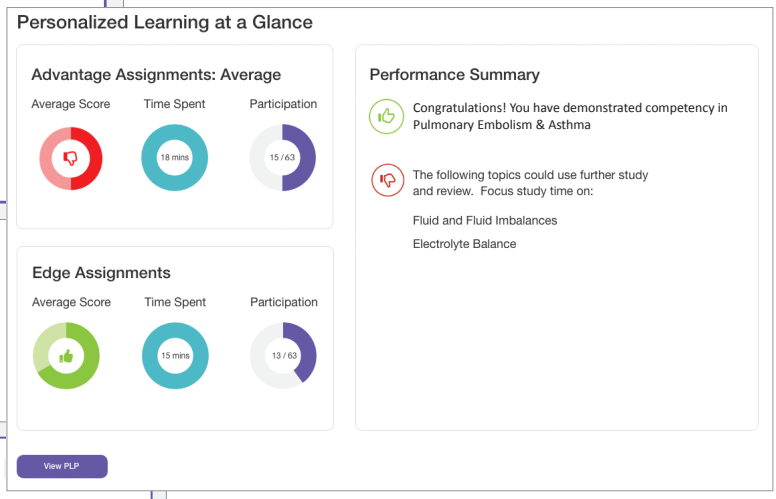


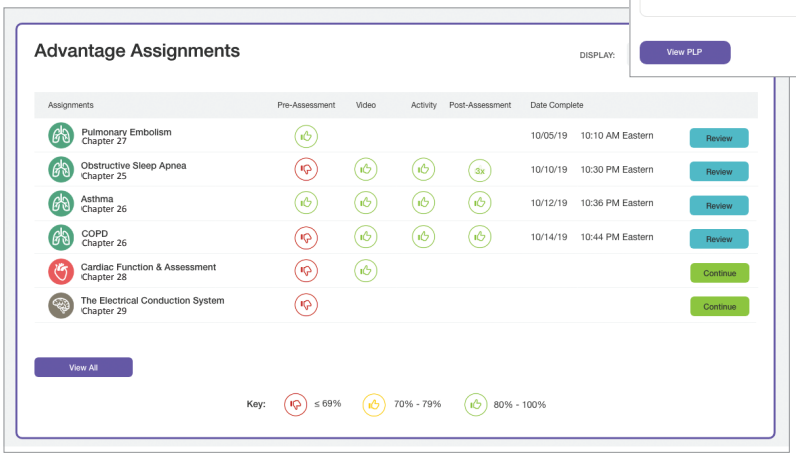

**Animated mini-lecture videos** make key concepts easier to understand, while **interactive learning activities** allow you to apply your knowledge and make the connections.




After working through the video and activity, a **Post-Assessment** quiz tests your mastery. The results feed into your **Personalized Learning Plan**, where your instructor is able to view them.




Your dashboard provides a snapshot of your **performance at a glance** as you work through your assignments.

Your **Personalized Learning Plan** is mapped to your needs and tracks your progress by topic to identify the exact areas that require additional study.

Online content subject to change upon publication.

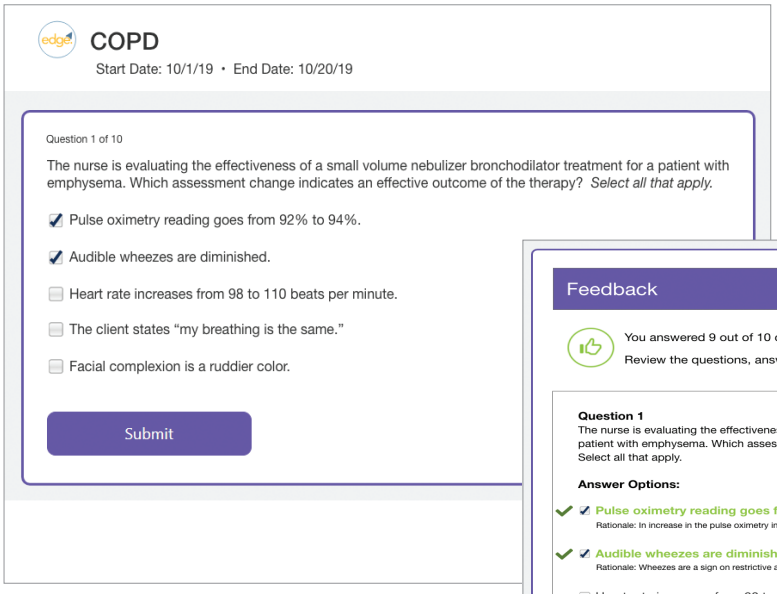



# ASSESSING

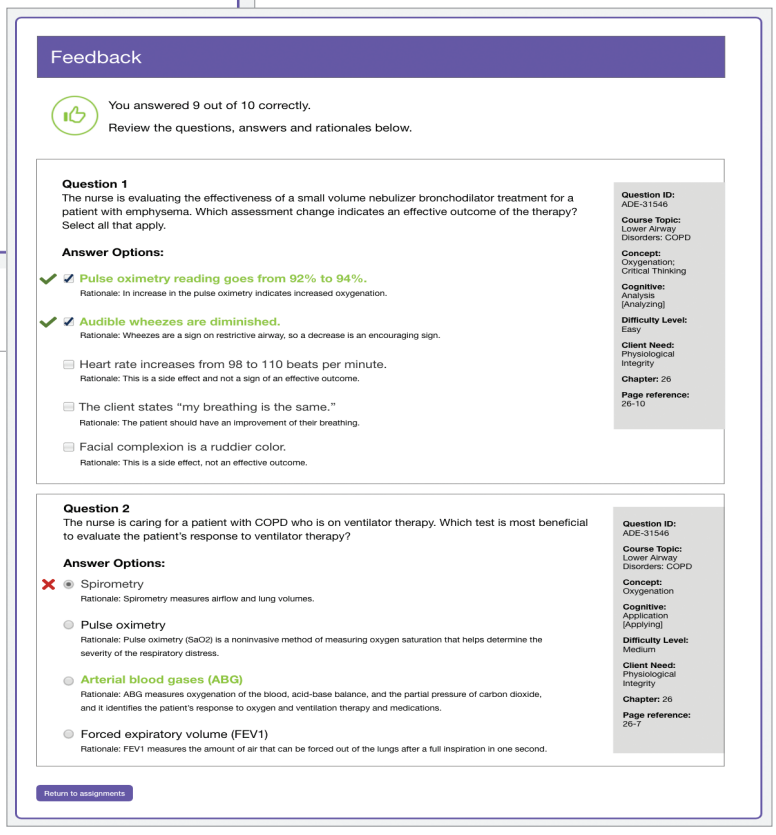
## Building mastery and improving test scores with Personalized Quizzing

NCLEX®-style Q&A provides the additional practice you need to master Med-Surg content and improve your scores on classroom exams.

## STEP #3 Study smarter, not harder with Davis Edge quizzing.



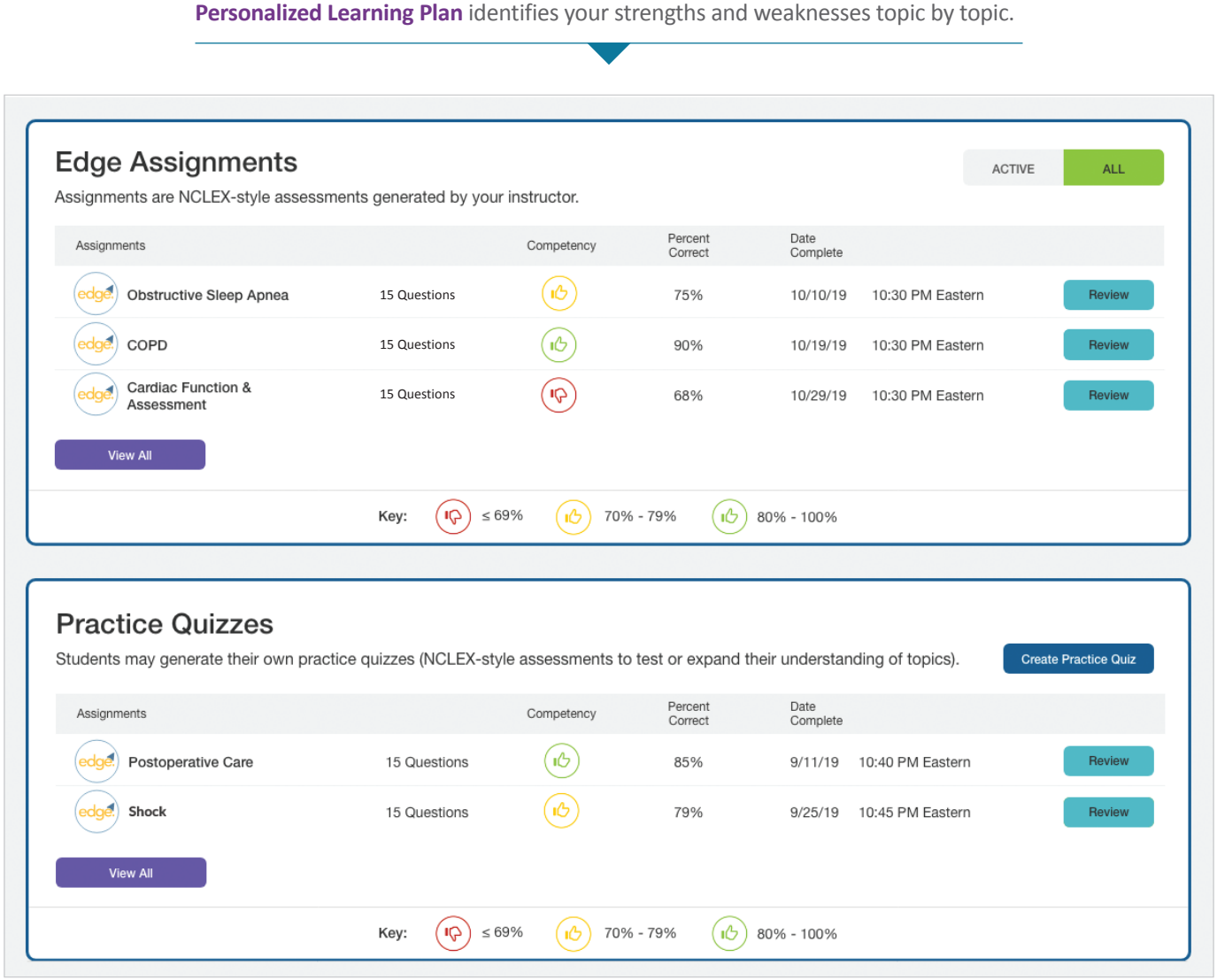

**NCLEX®-style questions** assess your understanding and challenge you to think critically. Practice with standard format questions like **multiple choice,** as well as more difficult format types such as **select all that apply**.




Immediate feedback with **comprehensive rationales** explains why your responses are **correct** or **incorrect**. Page-specific references direct you to the relevant content in your *Medical-Surgical Nursing* text, while **Test-Taking Tips** improve your test-taking skills.

Online content subject to change upon publication.

As you complete the **Davis Edge assignments** created by your instructor, your **Personalized Learning Plan** identifies your strengths and weaknesses topic by topic.




Create your own **practice quizzes** to focus on topic areas where you are struggling, or as a study tool to review for an upcoming exam.

# GET STARTED

by using the access code on the inside front cover of the book to unlock **Davis Advantage** for **Medical-Surgical Nursing** today!

# Table of Contents


**Unit I Professional Foundations of Medical-Surgical Nursing**
1. Foundations for Medical-Surgical Nursing
2. Interprofessional Collaboration and Care Coordination
3. Cultural Considerations
4. Ethical Concepts
5. Palliative Care and End-of-Life Issues

**Unit II Clinical Principles of Medical-Surgical Nursing**
6. Geriatric Implications for Medical-Surgical Nursing
7. Oxygen Therapy Management
8. Fluid and Electrolyte Management
9. Acid-Base Balance
10. Overview of Infusion Therapies
11. Pain Management
12. Complementary and Alternative Care Initiatives
13. Overview of Cancer Care
14. Overview of Shock and Sepsis*

**Unit III Managing the Surgical Experience**
15. Priorities for the Preoperative Patient
16. Priorities for the Intraoperative Patient
17. Priorities for the Postoperative Patient

**Unit IV Promoting Health in Patients With Immune Disorders**
18. Assessment of Immune Function
19. Coordinating Care for Patients With Immune Disorders
20. Coordinating Care for Patients With Connective Tissue Disorders
21. Coordinating Care for Patients With Multidrug-Resistant Organism Infectious Disorders
22. Coordinating Care for Patients With HIV

**Unit V Promoting Health in Patients With Oxygenation Disorders**
23. Assessment of Respiratory Function
24. Coordinating Care for Patients With Infectious Respiratory Disorders
25. Coordinating Care for Patients With Upper Airway Disorders
26. Coordinating Care for Patients With Lower Airway Disorders
27. Coordinating Care for Critically Ill Patients With Respiratory Dysfunction*

**Unit VI Promoting Health in Patients With Circulatory or Perfusion Disorders**
28. Assessment of Cardiovascular Function
29. Coordinating Care for Patients With Cardiac Dysrhythmia
30. Coordinating Care for Patients With Cardiac Disorders
31. Coordinating Care for Patients With Vascular Disorders
32. Coordinating Care for Critically Ill Patients With Cardiovascular Dysfunction*

**Unit VII Promoting Health in Patients With Hematological Disorders**
33. Assessment of Hematological Function
34. Coordinating Care for Patients With Hematological Disorders

**Unit VIII Promoting Health in Patients With Neurological Disorders**
35. Assessment of Neurological Function
36. Coordinating Care for Patients With Brain Disorders
37. Coordinating Care for Patients With Spinal Cord Disorders
38. Coordinating Care for Patients With Peripheral Nervous System Disorders
39. Coordinating Care for Critically Ill Patients With Neurological Dysfunction*

**Unit IX Promoting Health in Patients With Endocrine Disorders**
40. Assessment of Endocrine Function
41. Coordinating Care for Patients With Pituitary Disorders
42. Coordinating Care for Patients With Adrenal Disorders
43. Coordinating Care for Patients With Thyroid and Parathyroid Disorders
44. Coordinating Care for Patients With Diabetes Mellitus

**Unit X Promoting Health in Patients With Sensory System Disorders**
45. Assessment of Visual Function
46. Coordinating Care for Patients With Visual Disorders
47. Assessment of Auditory Function
48. Coordinating Care for Patients With Hearing Disorders

**Unit XI Promoting Health in Patients With Integumentary Disorders**
49. Assessment of Integumentary Function
50. Coordinating Care for Patients With Skin Disorders
51. Coordinating Care for Patients With Burns*

**Unit XII Promoting Health in Patients With Musculoskeletal Disorders**
52. Assessment of Musculoskeletal Function
53. Coordinating Care for Patients With Musculoskeletal Disorders
54. Coordinating Care for Patients With Musculoskeletal Trauma

**Unit XIII Promoting Health in Patients With Gastrointestinal Disorders**
55. Assessment of Gastrointestinal Function
56. Coordinating Care for Patients With Oral and Esophageal Disorders
57. Coordinating Care for Patients With Stomach Disorders
58. Coordinating Care for Patients With Intestinal Disorders
59. Coordinating Care for Patients With Hepatic Disorders
60. Coordinating Care for Patients With Biliary and Pancreatic Disorders

**Unit XIV Promoting Health in Patients With Renal Disorders**
61. Assessment of Renal and Urinary Function
62. Coordinating Care for Patients With Renal Disorders
63. Coordinating Care for Patients With Urinary Disorders

**Unit XV Promoting Health in Patients With Reproductive Disorders**
64. Assessment of Reproductive Function
65. Coordinating Care for Female Patients With Reproductive and Breast Disorders
66. Coordinating Care for Male Patients With Reproductive and Breast Disorders
67. Coordinating Care for Patients With Sexually Transmitted Infection

**Unit XVI Promoting Health in Special Populations**
68. Managing Care for the Adult Patient With Obesity
69. Substance Use Disorders in the Adult Population
70. Emergency, Trauma, and Environmental Injuries*
71. Disasters, Mass Casualty Incidents, and Complex Emergencies*


* Denotes chapters dedicated to critical care.

This is an advanced sample chapter. Uncorrected page proofs may vary upon publication.

# Chapter 17

# Priorities for the Postoperative Patient

*Maren Reinholdt*

## LEARNING OUTCOMES

**Content in this chapter is designed to assist in:**

1. Discussing the significance of the postoperative period
2. Explaining the priority assessments for the post-surgical patient
3. Developing support strategies for the surgical patient's family in the immediate postoperative period
4. Applying the vital postoperative interventions for the patient in the immediate postoperative period
5. Evaluating postoperative interventions on the inpatient unit

## ESSENTIAL TERMS

**Anesthesia**
**Hand-off**
**Patient-controlled analgesia (PCA)**
**Phase I**
**Phase II**
**Phase III**
**Post-anesthesia care unit (PACU)**
**Sedation**

## CONCEPTS

- Assessment
- Comfort
- Fluid and Electrolyte Balance
- Medication
- Perioperative
- Safety
- Skin Integrity

## Finding Connections

### CASE STUDY: EPISODE 1

*Follow this patient throughout the chapter.*

Howard Wells is a 70-year-old African American man. He is widowed and lives with his daughter, a nurse. Mr. Wells's daughter brought him to the hospital today for surgery. Mr. Wells has colon cancer and is scheduled to have a partial colectomy in the operating room. His additional significant medical history includes coronary artery disease and myocardial infarction 3 years ago; he is in chronic atrial fibrillation, has obstructive sleep apnea, and has type 2 diabetes. His regular medications include metoprolol, Coumadin, and omeprazole. Mr. Wells is scheduled to have general anesthesia and is to be admitted to the hospital for a few days after surgery. Mr. Wells's daughter will wait in the family waiting room during the procedure. She is eager to visit him in the post-anesthesia care unit…

## INTRODUCTION

The postoperative period begins immediately after surgery and continues until the first follow-up postoperative physician visit. During this time, it is vital that the patient be closely monitored to ensure recovery and avoid serious complications that may occur related to the surgical experience. Postoperative care is delivered on a continuum. It begins in the post-anesthesia care unit immediately after surgery and continues either in a hospital setting or at home. The focus of this chapter is the specialized care delivered in the post-anesthesia care unit and important nursing assessments and interventions delivered on the general inpatient surgical unit.

## THE POST-ANESTHESIA CARE UNIT

The **post-anesthesia care unit (PACU)** is the special critical care unit where patients are transferred immediately following **sedation** or **anesthesia** for surgical, diagnostic, or therapeutic procedures. Because of anesthesia, there is a temporary decrease in or loss of consciousness and loss of motor and reflexive control of respiration. The transition from anesthesia

to recovery carries risks for potentially life-threatening complications as well as discomforts such as nausea and vomiting and pain. During this transition, patients need assistance to maintain a safe internal physiological balance.

The goal of care in the PACU is to safely allow the patient who has had anesthesia/sedation to awaken and resume normal bodily functions while controlling/minimizing pain and preventing complications of surgery and anesthesia. The PACU is generally located adjacent to the operating room (OR) or procedure area to decrease the time needed for transportation immediately following procedures and to ensure proximity to anesthesia providers if needed. The role of the nurse in the PACU is to frequently assess and monitor the patient's recovery from anesthesia and support and manage pain relief, maintaining and assessing the patient carefully. In addition, the nurse is responsible for educating the patient and family about the care following the PACU (next level of care), whether it be in the patient's home or in an acute care unit in the hospital.

Coordination of care with the staff and providers in the OR and the preoperative area as well as the availability of preoperative records defining all aspects of the patient's history are essential for the PACU nurse to adequately and completely assess the patient's condition, understand the potential risks or complications, and individualize care for each patient and family.

## Post-Anesthesia Care Unit Phases of Care

The American Society of PeriAnesthesia Nurses has defined three levels of PACU care: phase I, phase II, and phase III. **Phase I** involves the nursing care provided in the immediate post-anesthesia period. This phase is generally in the PACU or intensive care unit (ICU). There is intensive, close monitoring of all vital signs with continuous electrocardiogram monitoring. There is a focus on cardiac, respiratory, and neurological functions, surgical-site monitoring, and pain and temperature control. The goals of care in this phase are to stabilize the patient's vital signs, allow the patient to awaken from anesthesia, and achieve adequate pain control. After meeting specific criteria, the patient is transferred to phase II care or to an inpatient unit. The specific discharge criteria vary by institution but generally include:

- An awake patient with a stable airway
- Adequate oxygen saturation
- Stable vital signs

In **phase II**, the monitoring is less intensive because the patient has met the criteria allowing transfer from phase I. The focus of nursing care is on preparing the patient to be discharged to an extended-care environment or home. Again, the patient needs to meet specific criteria for discharge home (Box 17.1).

**Phase III**, or extended observation of post-anesthesia care, focuses on providing ongoing care for those patients remaining in the postoperative care area after discharge criteria have been met. Extended observation starts after phase II critical elements have been met, but additional care is needed because a transfer bed is not ready or transportation home is unavailable. When this occurs, the nurse continues to monitor and provide care to this patient. A delay in discharge home when anticipated after a same-day surgery is most often caused by uncontrolled postoperative nausea and vomiting or pain, delays in the surgery schedule and OR availability, and social factors, such as a responsible adult not being present to take the patient home. The goal is to prepare the patient for transfer to an inpatient unit when a transfer bed is made ready or self-care and discharge home.

### Box 17.1 Home Discharge Criteria

- The patient is awake and alert.
- Vital signs have returned to preoperative values.
- Tolerating liquids without nausea or vomiting
- Pain relief and comfort are provided with oral pain medications and nonpharmacological measures (e.g., positioning, pillow, cold and heat therapy).
- The patient is stable and able to walk safely.
- The patient is able to void (urinate) before discharge—voiding prior to discharge is typically required when urinary retention is a risk of the surgical procedure or the patient has a history of urine retention. The patient may go home without voiding if there is no risk per provider order.
- There are no signs of bleeding from the surgical site.
- Skin is intact, and the surgical wound is clean and dry.
- There are no adverse reactions or complications from surgery and nonsurgical procedures related to the surgery (e.g., radiology procedure).
- The patient demonstrates understanding of teaching, including medications and activities. It is critical that an interpreter is available if the patient does not speak or understand the English language.

### Connection Check 17.1

The nurse understands PACUs are designed for which of the following?

A. Managing the transition from anesthesia to long-term care
B. Managing the transition from anesthesia through phase III of recovery
C. Managing the transition from anesthesia through phase II of recovery
D. Managing the transition from anesthesia through rehabilitation

## Post-Anesthesia Care Unit Settings

Post-anesthesia care is provided in a variety of settings. They include but are not limited to:

- Inpatient PACU
- ICU

- Outpatient PACU
- Procedure areas

### *Inpatient Post-Anesthesia Care Unit*

The inpatient PACU is typically one big room, but recent PACUs are being designed with individual rooms for patient privacy. Patients are managed by anesthesia and nursing staff. Inpatient PACUs care for patients recovering from major or minor surgical procedures on a continuum from low to high risk of complications. Examples of surgical procedures requiring recovery in an inpatient PACU include radical retropubic prostatectomy, lung lobectomy, ileostomy reversal, nephrectomy, exploratory laparotomy, and open reduction and internal fixation of fractures.

The staffing varies according to the acuity level of the patients. The nurse–patient ratio can be 1:1 or 1:2. The extended-stay patients, patients meeting transfer or discharge criteria but requiring extended monitoring, may be in 1:3 ratios. The length of stay is generally short, 1 to 2 hours, except for the extended-stay patients, so patient flow is fast, with high volumes.

### *Intensive Care Unit*

Postoperative care in the ICU is indicated for critically ill patients who require extensive and complex monitoring because of the high risk of complications. These patients are transferred directly to the ICU immediately following the operative procedure. They are managed by the ICU team and nursing staff. Examples of patients who undergo recovery in the ICU setting include patients undergoing transplant surgery, craniotomy, and coronary artery bypass procedures and trauma patients undergoing multiple procedures.

### *Outpatient Post-Anesthesia Care Unit*

Outpatient post-anesthesia care is provided for patients going home after the procedure. The post-anesthesia care is delivered in the same outpatient setting where the procedure is performed. These settings include an outpatient area in the hospital setting, freestanding ambulatory surgery centers, providers' offices, urgent-care centers, and rural health clinics.

Examples of procedures done on an outpatient basis include orthopedic arthroscopic procedures and cholecystectomies. Outpatient procedures can also include more complex procedures such as mastectomy. Other procedures commonly performed in surgery centers or provider offices include diagnostic procedures, dental procedures, some plastic surgery, and ophthalmological procedures.

### *Procedure Areas*

Patients undergoing procedures in a "procedure area" such as endoscopy or cardiac vascular interventional laboratories require postoperative monitoring and care in the procedural area if IV sedation or anesthesia is required for the procedure before return to the inpatient setting or being discharged home.

**Connection Check 17.2**

The nurse understands that a patient undergoing right upper lobe lobectomy requiring general anesthesia will receive recovery care in which of the following settings?

A. Outpatient PACU
B. Procedure area PACU
C. Surgical center PACU
D. Inpatient PACU

## PATIENT CARE IN THE POST-ANESTHESIA CARE UNIT

Patients are all individuals and react differently to the different types of medications, treatments, surgery, procedures, or anesthesia. Therefore, postoperative nursing management should be individualized and should include:

- Assessment and monitoring of the patient's response to surgery and anesthesia
- Timely interventions to resolve the problems, concerns, and needs of patients (physical, psychological, emotional, spiritual)
- Evaluation of these interventions, including effects or adverse effects of medications (e.g., opioids)
- Reassessment of the patient's condition
- Evaluation of achievement of discharge criteria

### Priority Assessments

The patient is brought into the PACU immediately following surgery accompanied by the anesthesia provider who provided care for the patient during the surgical procedure, a member of the surgical team, and an OR nurse. Good OR–PACU coordination is necessary to ensure a good transition of care. In addition to all of the priority needs, good communication is necessary during the initial transfer from the OR table to the correct stretcher or bed before transfer to the PACU; some patients may require a special bed to best meet their recovery needs.

On admission to the PACU, the patient is simultaneously connected to cardiac and other monitoring devices while an immediate assessment is performed. Critical areas of assessment on admission to the PACU include the following:

- Airway patency
- Respiratory status, including oxygen saturation (and capnography, if indicated) and auscultation of lung sounds
- Vital signs:
  - Blood pressure
  - Pulse: apical and peripheral
  - Cardiac monitor rhythm
  - Hemodynamic pressure readings if indicated
  - Temperature
- Neurological function, including level of consciousness, motor function, and sensation
- Temperature and color of skin

- Pain level/comfort level
- Condition of dressings; assessing for bleeding or drainage
- Condition of visible incisions
- Presence and patency of IV catheters, drains, and other catheters
- Hydration status and fluid therapy

### *Diagnostic Tests*

Laboratory tests done postoperatively assess for bleeding, fluid loss, electrolyte imbalance, renal function, and clotting abnormalities. Table 17.1 outlines common laboratory tests done postoperatively. Depending on the patient and comorbidities, some of these tests are done in the initial recovery stage, such as a glucose test if it is a patient with diabetes, but most are done the next day, on postoperative day 1 (POD 1), as routine screening for postoperative complications.

Other studies done postoperatively may include:

- Chest radiograph
- Electrocardiogram (ECG)

A chest radiograph is done postoperatively if any complications from surgery due to central line placement, intubation, or anesthesia are suspected. An ECG is always done as a preoperative assessment. It is ordered postoperatively if any ECG changes were identified during surgery or after. Measurement of the ST segment among post-anesthesia patients will detect perioperative acute myocardial ischemia, and cardiac rhythm analysis may detect postoperative atrial fibrillation.

**Table 17.1 Common Laboratory Tests in the PACU**

| Category | Significance |
|---|---|
| Prothrombin time/activated partial thromboplastin time (PT/aPTT); international normalized ratio (INR)/ platelet count | These tests are done to evaluate clotting abnormalities. This is significant because of the possibility of bleeding postoperatively. It is also important to monitor if patients were on anticoagulants preoperatively.<br>Normal values:<br>PT: 10–13 seconds<br>aPTT: 25–35 seconds<br>INR: 0.9–1.1 |
| Renal function: blood urea nitrogen (BUN), creatinine | Renal function may be decreased because of dehydration from blood or fluid loss. Consider age and renal disease.<br>Normal values:<br>BUN: 8–21 mg/dL<br>Creatinine: 0.5–1.2 mg/dL |
| Glucose | Decreased glucose levels should be ruled out in cases of decreases in level of consciousness or inability to arouse postoperatively.<br>Normal value:<br>Glucose: 65–99 mg/dL fasting blood glucose level |
| Electrolytes: serum potassium (K), serum sodium (Na) | Values may be abnormal because of fluid loss, blood loss, or overhydration.<br>Normal values:<br>Potassium: 3.5–5.0 mEq/L<br>Sodium: 135–145 mEq/L |
| White blood cell (WBC) count | An increase in the WBC count may indicate infection.<br>Normal value:<br>WBC count: 4.5–11.1 $10^3/mm^3$ |
| Hematocrit/hemoglobin | Low values may indicate excessive blood loss.<br>Normal values:<br>Hematocrit: females, 36%–48%; males, 42%–52%<br>Hemoglobin: females: 11.7–15.5 g/dL; males, 14–17.3 g/dL |

*PACU,* Post-anesthesia care unit.

### Connection Check 17.3

The nurse understands that the immediate postoperative assessment upon admission to the PACU includes which of the following? *(Select all that apply.)*

A. Medical history
B. Full system review
C. Neurological assessment
D. Blood pressure
E. Surgical-site drainage

## Pain Management

Pain management is an essential component of patient management in the PACU and beyond. In the preoperative area, the nurse assesses and documents the patient's physical and emotional status and discusses pain management following surgery. It is important that the nurse understands each patient's perception of pain, teaches him or her about postoperative pain management expectations, and engages the patient and family in developing a postoperative pain management plan. Important discussion and education points include:

- The importance of pain control and treating pain before it becomes severe
- The importance of reporting pain; terminology; pain scale that will be used in the PACU; patient's terminology regarding pain location and intensity
- Goals of treatment for pain, understanding that on a scale of 0 to 10, a goal of zero pain is often not realistic
- Pharmacological and nonpharmacological options available to manage pain in the PACU
- Fears about pain medication, such as addiction
- Chronic, current, or past use of opioids
- Nonpharmacological methods that the patient currently uses to reduce anxiety and improve comfort (e.g., music, deep breathing, prayer)
- Whether having family at the bedside is helpful or if the patient prefers to be alone

### *Pain Management Strategies*

Although postoperative pain is expected in all patients, behavioral responses to pain vary widely from patient to patient. During the immediate postoperative period, anesthetic effects may mask or prevent the patient from reporting pain. The PACU nurse should use an appropriate method of pain assessment for the patient, such as a numerical scale, the Wong–Baker FACES scale, or a behavioral scale. The PACU nurse must know that there are physiological signs that indicate pain even if the patient is unable or unwilling to describe what he or she is feeling. These include restlessness; sweating; dilation of pupils; increase in respiration, blood pressure, and heart rate; and piloerection. Additionally, the patient may be frowning, opening his or her eyes widely, making facial grimaces, clenching the teeth, or moaning—all indications of pain. It is recommended that the nurse assume that pain is present, with or without overt symptoms, and provide treatment based on the knowledge that surgery is painful (see Evidence-Based Practice: Postoperative Pain Management Strategies).

### Evidence-Based Practice

**Postoperative Pain Management Strategies**

In 2016, the American Pain Society, in conjunction with other professional organizations, published a clinical practice guideline on treating postoperative pain. The report states that although most patients experience pain postoperatively, less than half of the patients say that their pain is adequately controlled. The clinical practice guideline comprises 32 recommendations made by an expert panel after a systematic review of the evidence. The recommendations include preoperative evaluation for current opioid use and education about pain control expectations, tailoring of pain control plans to the individual patient and surgery, and the use of different pharmacological and nonpharmacological modalities (e.g., combining analgesics like ketamine, lidocaine, gabapentin, and pregabalin with opioids and the use of transcutaneous electrical nerve stimulation). The panel also recommends that clinicians provide education to all patients and primary caregivers on how to taper off pain medications.

Chou, R., Gordon, C. B., de Leon-Casasola, O. A., Rosenberg, J. M., Bickler, S., Brenan, T., ...Wu, C. L. (2016). Guidelines on the management of postoperative pain. *Journal of Pain, 17*(2), 131–157. doi:10.1016/j.pain.2015.12.008

The best results in postoperative pain management involve multimodal pharmacological therapy or synchronous administration of NSAIDs, acetaminophen, opioids, and local anesthetics. In addition to pain medication, studies demonstrate that a variety of nonpharmacological methods decrease pain (and the need for medication) postoperatively, such as music therapy, massage, prayer, and meditation; however, few PACUs offer these options to all patients as a part of their pain management programs.

Many postoperative patients are given a **patient-controlled analgesia (PCA)** pump for the delivery of opioid medications (Fig. 17.1). A PCA pump is an infusion of a prescribed amount of analgesia through an IV route when the patient pushes a button. This requires the patient to be able to understand and communicate effectively with the

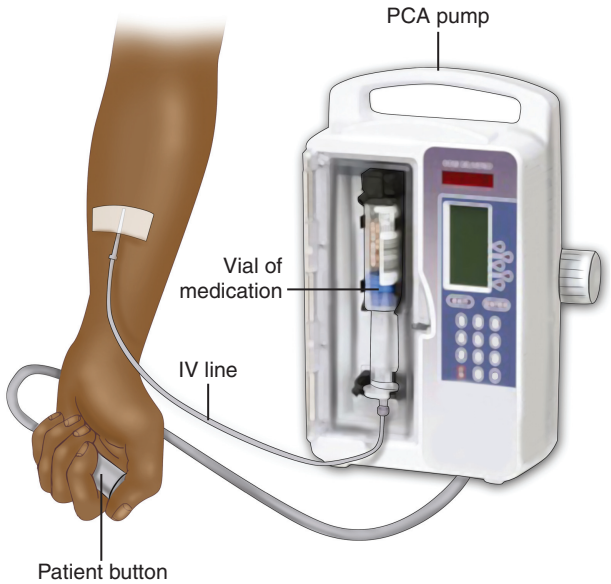



**FIGURE 17.1** Patient-controlled analgesia (PCA) pump. The patient pushes a button when pain medication is required, resulting in the delivery of a preset dose of pain medication through the IV line.

nurse and might not be appropriate therapy if cognitive or communication problems exist. Assessment of the patient in the preoperative area prior to initiating PCA is essential to the safe implementation of this type of pain control. Also important is education that only the patient (not family members, the nurse, or other healthcare providers) should push the button to deliver a dose of the pain medication.

## Management of Postoperative Nausea and Vomiting (PONV)

Postoperative nausea and vomiting (PONV) is often more anticipated and feared by patients than postoperative pain. In the immediate postoperative period, PONV can cause dehydration, electrolyte imbalance, wound dehiscence, and aspiration. Postoperative nausea and vomiting has been associated with an increased length of stay, a decreased ability to perform activities of daily living and return to school/work after discharge, and emergency department visits and hospital readmissions. Risk factors for PONV include being a young, nonsmoking female and having a history of PONV or motion sickness. Certain types of surgeries are more likely to cause PONV, such as cholecystectomies and laparoscopic, intra-abdominal, gynecological, and neurological surgeries. General anesthesia causes more PONV than regional anesthesia. The longer the patient is under general anesthesia, the more likely the patient is to experience PONV. High doses of the neuromuscular blockade reversing agent neostigmine also increase the likelihood of PONV.

In order to treat PONV, postoperative opioid use should be minimized, and hydration should be optimized. It is suggested that nausea be measured on a numerical scale, much like pain, or a descriptor scale (mild, moderate, severe) so that providers can decide which antiemetic approach to use. This method of rating nausea gives nurses the ability to determine the effectiveness of different pharmacological agents. Multimodal pain management strategies should be taken to avoid relying on opioids alone, which increase PONV. Prophylactic treatment by using a combination of antiemetic medications in high-risk patients before surgery can help reduce PONV.

### Connection Check 17.4

Which statement is true about the complicated nature of managing pain medication in the immediate post-anesthesia patient?

A. All patients respond to pain in the same way but have different medications ordered.
B. All patients respond to pain in different ways, potentially requiring different medications.
C. The synergy of all multimodal pain management is unpredictable.
D. Nonpharmacological methods of pain control do not work in the PACU setting.

### CASE STUDY: EPISODE 2

Mr. Wells is transferred from the OR to the PACU. He is drowsy but responds to his name. He has on an oxygen mask, and a nasogastric tube is in place. He has a urinary catheter and is on the cardiac monitor, which shows atrial fibrillation with a rate of 85 beats per minute (bpm) and a respiratory rate of 12. His oxygen saturation is 97%. His breath sounds are clear and equal bilaterally. He has a dry abdominal dressing and two drains draining a small amount of sanguineous liquid. On his legs, he has intermittent pneumatic compression boots that are connected to the small pump on the bed. In addition to IV fluid that is running, Mr. Wells has a PCA pump, and he received IV doses of fentanyl and morphine before leaving the OR. He responds to his name and shakes his head "no" when asked if he has any pain. He says the pain is 1 on a scale of 0 to 10…

## Potential Complications

Immediately following surgery and anesthesia, all patients are at risk for respiratory depression from anesthesia and pain medication and bleeding from the surgical procedure itself, requiring careful and frequent nursing assessment. In addition to these major complications, Table 17.2 includes

additional serious complications that require either prevention or treatment in the PACU (see Geriatric/Gerontological Considerations).

## Geriatric/Gerontological Considerations

The normal physiological decline associated with aging (see Chapter 6) can be exacerbated by the effects of stress of surgery, anesthesia, and immobility. Older adults are at higher risk for postoperative complications, delayed recovery, and an increased length of stay. The postoperative nurse should anticipate the following:

- Respiratory: decreased rib-cage expansion, increasing the risk for atelectasis; hypoxia; hypercarbia; increased work of breathing
- Cardiac: reduced cardiac output; hypotension, which can develop quickly; higher risk for postoperative atrial fibrillation; greater risk for orthostatic hypotension related to dehydration
- Renal: greater risk for postoperative volume overload and electrolyte imbalances; greater risk of medication toxicity—requires careful evaluation of dosage of medications excreted by the kidney
- Skin: more susceptible to friction, sheer, pressure, and moisture
- Delirium: higher risk postoperatively. Free from tethering devices as soon as possible, avoid physical restraint, use nonpharmacological interventions (e.g., reorientation, fall risk precautions, involve family in care), and consider administering antipsychotics.
- Immobility/decreased mobility: increased risk of deep vein thrombosis (DVT), pneumonia, pressure injuries, respiratory failure, delirium, orthostatic hypotension, and fatigue
- Nutrition: the older adult is more likely to have inadequate nutrients for wound healing and strength.

# NURSING MANAGEMENT

## Nursing Interventions

### *Assessment*

- Neurological: level of consciousness/motor and sensation
  *Anesthesia produces a decreased level of consciousness or a reversible loss of consciousness. A continued decrease in level of consciousness, restlessness, agitation, and confusion may indicate inadequate reversal of anesthesia or complications of anesthesia or could also be a result of hypoxia. Motor and sensation abilities must also be monitored to assess for the reversal of any nerve blocks administered during surgery for patient safety.*
- Vital signs
  *Any deviation from the normal range of values for blood pressure, heart rate, oxygenation saturation, respiratory rate, or temperature could indicate a postoperative complication.*
  *Excessive blood or fluid loss may cause hypotension and tachycardia.*
  *Excess catecholamine production from the physical and emotional stress of surgery may cause hypertension and tachycardia.*
  *Increased or decreased respiratory rate, use of accessory muscles, and decreased oxygen saturation may indicate inadequate reversal of or recovery from anesthesia.*
  *Increased temperature may be an indication of malignant hyperthermia, which can be triggered by anesthesia; hypothermia, not unusual postoperatively because of cool OR temperatures, prolonged skin exposure, and anesthesia that interferes with normal temperature control, may require warming measures.*
- Peripheral pulses/skin temperature/skin color
  *Weak peripheral pulses, cool skin temperature, and/or pale skin color could signify inadequate perfusion resulting from blood loss and decreased cardiac output.*
- Urine output
  *Decreased urine output, less than 30 mL/hr, may indicate dehydration due to fluid or blood loss or urinary retention.*
- Pain
  *Pain is an expected outcome of a surgical procedure but should be managed appropriately. Regular assessment of pain is necessary for the evaluation of pain management. Uncontrolled pain may be an indication of a complication.*
- Skin/surgical incisions/wounds
  *Extended time in intraoperative positioning may cause excessive pressure and skin breakdown. Excessive blood or drainage on wound dressings may indicate inadequate wound closure or bleeding and requires follow-up by the provider.*

### *Actions*

- Connect to continuous cardiac monitor immediately upon admission to the PACU.
  *Changes in vital signs or dysrhythmias may indicate complications associated with anesthesia or the operative procedure.*
- Start admission assessment immediately upon admission to the PACU.
  *It is essential to get a baseline to understand the patient's presenting status.*
- Document vital signs.
  *Vital signs are often documented every 15 minutes to allow prompt response to changes as necessary.*

**Table 17.2 Potential Complications in the PACU**

| System | Complication | Intervention |
|---|---|---|
| ***Neurological*** | • Drowsy and hard to arouse<br>• Restless<br>• Not following commands<br>• Confusion | • Check glucose level.<br>• Hold pain medication.<br>• Consider naloxone (Narcan).<br>• Restrain as ordered.<br>• Reorient/provide explanation/reassurance.<br>• Have family present as possible.<br>• Evaluate oxygenation; evaluate for alcohol withdrawal. |
| ***Respiratory*** | • Airway obstruction/stridor<br>• Inadequate oxygenation<br>• Ineffective ventilation<br>• Aspiration | • Check airway and $O_2$ saturation.<br>• Check breath sounds (auscultate).<br>• Supplement oxygen as per provider's orders.<br>• Consider ventilatory support.<br>• Chest radiograph |
| ***Cardiovascular*** | • Hypotension<br>• Tachycardia<br>• Bleeding<br>• Venous thromboembolism (VTE)/pulmonary embolism (PE)<br>• Dysrhythmias<br>• Myocardial infarction<br>• Fluid imbalance; dehydration/retention | • Monitor vital signs.<br>• Fluid and blood replacement as ordered.<br>• For prevention of VTE: compression stockings, intermittent pneumatic compression boots<br>• For treatment of VTE: anticoagulation<br>• Monitor intake and output.<br>• Monitor electrolytes. |
| ***Thermoregulation*** | • Hyperthermia | • Monitor for malignant hyperthermia.<br>Initiate emergency treatment as necessary, including administration of dantrolene (see Chapter 16 for discussion of malignant hyperthermia). |
| | • Hypothermia | • Provide warm blankets or warming devices for hypothermia. Provide supplemental oxygen as shivering increases demand. |
| ***Gastrointestinal*** | • Postoperative nausea and vomiting (PONV) | • Administer antiemetics.<br>• Anticipate and prevent aspiration if vomiting—head of bed elevated and/or side-lying position as possible. |
| ***Genitourinary*** | • Urinary retention | • Bladder scan<br>• Consider Foley catheter.<br>• Suggest standing (men) when attempting to void when possible. |
| ***Skin integrity*** | • Skin breakdown or redness at pressure sites<br>• Abnormal wound drainage; yellow/cloudy, bloody, foul-smelling<br>• Severe wound complications such as dehiscence (wound rupture along surgical suture) or evisceration (extrusion of viscera outside the body through the surgical incision; Fig. 17.2) | • Relieve pressure as possible through positioning and support with blankets and pillows.<br>• Check amount of drainage, color, and frequency of dressing change; reinforce dressing and report to provider.<br>• Dehiscence/evisceration requires immediate notification and intervention by the surgeon; maintain low Fowler's position, minimize movement, and cover wound with sterile saline dressing. |

**Table 17.2 Potential Complications in the PACU—cont'd**

| System | Complication | Intervention |
|---|---|---|
| ***Pain (see Chapter 11 for more information on pain control)*** | • Persistent pain may lead to deconditioning and respiratory comprise, such as atelectasis, through decreased mobility; hormonal response, such as excess catecholamine production resulting in hypertension and tachycardia; and neuropsychiatric effects, such as insomnia. | • Mild pain—nonopioid (e.g., acetaminophen, NSAIDs)<br>• Moderate to severe pain—multimodal therapy: nonopioids, mμ opioid agonists (e.g., morphine, hydromorphone, fentanyl), and adjuvants (e.g., anticonvulsants, local anesthesia, antidepressants)<br>• Other pain modalities provided by the providers and supported by the nurses: preemptive analgesia (given preoperatively by anesthesia) and rescue analgesia (given postoperatively to supplement pain medication)<br>• Other considerations: multimodal therapy (opioid and nonopioid analgesia to avoid unwanted sedation, regional blocks by anesthesia providers, and systemic or epidural patient-controlled anesthesia (PCA). Systemic PCA (IV) is used more often than epidural PCA for surgery below the waist or specific area that needs an analgesia block (e.g., thoracic block).<br>• Comfort measures: physical/psychological (e.g., positioning, heat and cold therapies, sensory aids), sociocultural (e.g., family, caregiver, interpreter), psychospiritual (e.g., chaplain, religious objects), and environmental (e.g., reasonably quiet room, privacy) |

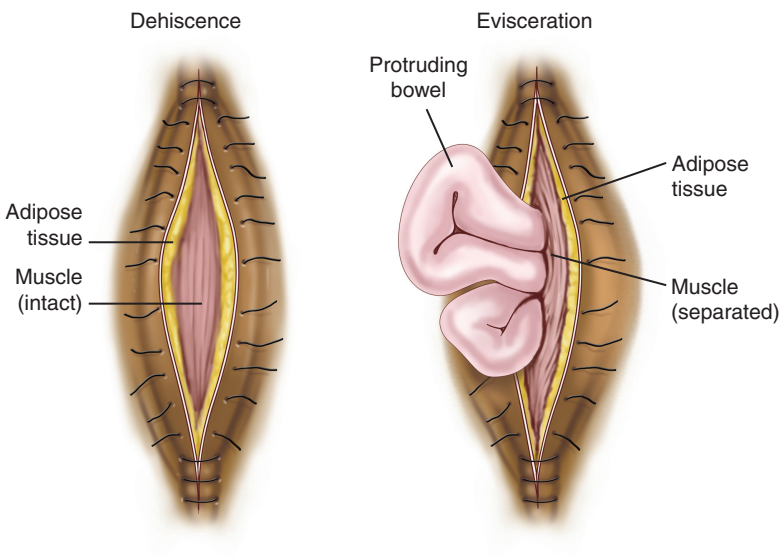



**FIGURE 17.2** Surgical wound-healing complications include wound dehiscence; wound rupture along the surgical suture line; and wound evisceration, the extrusion of viscera outside the body through the surgical incision.

- Participation in hand-off from the OR
  *Good communication is essential for a smooth transition of care between the OR and PACU to ensure the patient's needs are met and complications are avoided as much as possible (Box 17.2).*
- Continuous monitoring of patient's status
  *The initial PACU assessment is compared with the preoperative assessment. The assessment is monitored continuously to track the patient's recovery or to identify problems.*
- Medicate as ordered for pain and nausea.
  *Nausea centers may be triggered by anesthesia; pain is a result of tissue trauma from surgery.*
- Hand-off to inpatient unit if necessary (Box 17.3)
  *A clear, concise hand-off to the inpatient unit is essential for safe patient care.*

### *Teaching*

- Family care (Box 17.4)
  - Inform family when the patient arrives in the PACU, and make contact every hour.
  - Communicate plan of care (i.e., time of transfer to bed or discharge home).
  - Allow visiting per hospital guidelines.

## Box 17.2 Hand-Off of Care—OR to PACU

Transferring patient care, especially immediately after surgery, requires effective multidisciplinary communication. Without effective hand-off communication, there is an added risk of error due to lack of information and/or misinformation.

Following the admission assessment confirming the patient's stability, the PACU nurse participates in the **hand-off** communication with the three OR team members who have accompanied the patient in transfer (anesthesia, surgical team member, and OR nurse). This hand-off communication includes:

- Patient identification using two identifiers
- Significant medical history
  - Details about the surgical procedure/significant events that occurred in the OR
  - Significant laboratory results
  - Anesthesia and reversal agents administered intraoperatively
- Medications administered intraoperatively, including last dose of pain medication
- Fluid intake and estimated blood loss
- Placement of IV lines and drains
- Important home medications
- Discussion of actual and/or potential clinical issues (e.g., pain, changes in vital signs)
- Nonclinical information, such as family or placement issues
- Overall plan of care
- Team members' names and contact information

Both providers and the OR nurse give their own report. Prior to handing off care to the PACU nurse, the surgical provider and PACU nurse should discuss orders that have been written, the plan for pain management, and any potential complications that can be anticipated.

*OR,* Operating room; *PACU,* post-anesthesia care unit.

- If the patient is being discharged, provide discharge instructions with family members present. *Communicating and maintaining contact with a family member, as well as allowing visitation, is essential to help relieve anxiety and stress.*
  *Because of the effects of anesthesia, the patient may not remember discharge instructions. Having a family member present is essential.*

### Connection Check 17.5

Upon patient admission to the PACU, the nurse understands that the priority intervention is which of the following?

A. Administer antiemetics.
B. Administer pain medication.
C. Connect patient to the monitor.
D. Start IV fluid.

## Box 17.3 Hand-Off of Care—PACU to Inpatient Unit

The clear and concise hand-off of care from the PACU nurse to the inpatient unit nurse is crucial to a smooth and safe transition of care. Important components to include are:

- Surgical procedure
- Perioperative treatment course, including medications and fluids received intraoperatively
- Surgical complications, if any
- Past medical history
- Current vital signs
- Current assessment status
- Surgical incision and drain information
- Medications received for pain and/or nausea
- Plan for pain management
- Time for the receiving nurse to ask any clarifying questions to adequately prepare for accepting the patient into the nurse's care.

*PACU,* Post-anesthesia care unit.

## Box 17-4 Family Visitation

Following the comprehensive admission assessment by the PACU nurse, a family member/loved one may be invited to have a brief visit with the patient in the PACU. It is believed that family visits can decrease anxiety for both the patient and loved one, improve family satisfaction, and encourage family support. Prior to the visit, the nurse ensures that the patient is awake and that pain is well controlled, sets expectations regarding the intended length of the visit, and explains the environment to the family member. During the visit, the PACU nurse should be available to answer questions about the procedure and the next level of care, such as being transferred to the inpatient surgical unit. Patients and family members are typically eager to know about transfer timing and expectations of care on the receiving unit. If the patient is being discharged to home, patient teaching prior to discharge should always be done with a family member present.

Many family members feel it is their right to be able to visit in the PACU; however, the nurse is empowered to terminate the visit depending on the patient, visitor, and unit circumstances. Protecting the safety, privacy, and confidentiality of all patients (and other family members) in the unit is a priority.

*PACU,* Post-anesthesia care unit.

## PATIENT CARE ON THE INPATIENT UNIT

After receiving the hand-off from the PACU nurse, the inpatient nurse must review the new orders written by the provider on the postoperative inpatient unit to prepare to care for the patient in this new setting. Orders will contain

information about vital sign parameters; activity and diet (see Evidence-Based Practice: Diet After Surgery); medications for postoperative pain, nausea, and vomiting; thromboembolism prophylaxis; postoperative imaging and laboratory studies; any special precautions related to the surgery; and the continuation of the patient's routine, preoperative medications. The nurse and staff of the inpatient unit can then begin setting up the room with the supplies necessary to support the patient.

Once the patient has arrived, taking vital signs and completing a thorough assessment should begin immediately to establish a baseline. This baseline can be compared to presurgical status and can be used to evaluate the patient's postoperative progress. Patients who are transferred to an inpatient unit are susceptible to many complications, so it is imperative that assessments identify any changes that need intervention.

## Evidence-Based Practice

### Diet After Surgery

Diet orders after surgery depend greatly on the type of surgery performed. The traditional idea of a patient progressing from ice chips or a clear liquid diet up to a regular diet is not supported by current evidence. For example, those who have had neurosurgery may not be able to eat until an evaluation of their swallowing ability has occurred because of possible cranial nerve disruption resulting in swallowing impairment. Patients who have had gastrointestinal surgery may have volume intolerance because of a risk for a leak at anastomosis sites in the postoperative period. Otolaryngology patients may not be able to eat a regular diet because they cannot chew or are at an increased risk for infection if foods pocket in surgical sites in the oral cavity. Some patients complain of very sore throats following intubation and benefit from choosing softer foods. Early feeding after surgery is generally safe, speeds recovery, shortens length of stay, and is more in line with patient preferences. Interestingly, some studies suggest gum chewing to recover bowel function more quickly when treating an ileus.

Boarin, M., Villa, G., Di Monte, V., Abbadessa, F., & Manara, D. F. (2017). The use of chewing gum for postoperative ileus prevention in patients undergoing radical cystectomy. *International Journal of Urology Nursing,* 11(3), 129–135. doi:10.1111/ijun.12141

Short, V., Herbert, G., Perry, R., Atkison, C., Ness, A. R., Penfold, C., ... Lewis, S. J. (2015). Chewing gum for postoperative recovery of gastrointestinal function. *Cochrane Database of Systematic Reviews, 2015*(2), CD006506. doi:10.1002/14651858.CD006506.pub3

Willcutts, K. (2013). *Post-operative feeding: Time to move on*. [PowerPoint Slides]. Retrieved from https://www.cnmdpg.org/docs/Symposium/2013/Handouts/Willcutts,%20Kate%20Handout%20PostopFeeding CNM2013handout.pdf

## Potential Postoperative Complications

### *Respiratory System*

Some potential complications in the respiratory system include atelectasis, pneumonia, and pulmonary embolus, all potentially resulting in inadequate gas exchange, hypoxemia, and hypoxia. All are related to hypoventilation, venous stasis, and an ineffective cough secondary to immobility and pain. Immobility can cause an accumulation of mucus in the lungs, resulting in atelectasis and pneumonia. Immobility can also result in venous stasis and clot formation or deep vein thrombosis (DVT) formation, which can ultimately result in a pulmonary embolus. Pain can cause hypoventilation, which results in poor gas exchange and a weakened cough, further compromising the removal of secretions and oxygenation.

### *Cardiovascular System*

The body's natural stress response to the surgical procedure may result in fluid and electrolyte complications. Acute stress and surgical fluid losses lead to a sympathetic response of tachycardia and vasoconstriction. There is increased secretion of adrenocorticotropic hormone (ACTH), stimulating the adrenals to release cortisol, hydrocortisone, and aldosterone. The pituitary is stimulated to release antidiuretic hormone (ADH), and the renin–angiotensin–aldosterone system (RAAS) is stimulated. All result in fluid retention, sodium retention, and urinary loss of potassium. This may result in fluid overload and hypokalemia. Hypokalemia affects cardiac contractility and may lead to lethal dysrhythmias. Conversely, fluid losses secondary to untreated or poorly treated preoperative dehydration, surgical fluid losses, bleeding, wound drainage, and/or vomiting may result in decreased cardiac output and poor tissue perfusion.

### *Neurological System*

There are several severe neurological complications related to surgery and, more specifically, anesthesia. Delirium, defined as inattention and disorganized thinking, is a common complication affecting up to 70% of patients over 60 years of age. It is associated with persistent cognitive decline, prolonged ICU and hospital length of stay, and increased mortality. Treatment is mostly based on recognition of populations at risk and prevention. Preventative measures include decreasing the irritation of invasive lines, tubes, and drains that increase agitation as quickly as possible. Antipsychotic medications, such as low-dose haloperidol (Haldol), may be used as a treatment, along with reorientation and reassurance. Another complication common in the older patient is postoperative cognitive decline (POCD), which can be subtle and temporary or may last for weeks or months, causing delays in return to normal functioning such as work.

For both delirium and POCD, measures such as maintaining stable hemodynamic parameters, normal bowel and bladder functioning, early mobility, and frequent reorientation are helpful in preventing or limiting cognitive issues

### *Gastrointestinal System*

Postoperative ileus (POI), a slowing of gastric and bowel mobility, is a complication largely associated with gastrointestinal (GI) surgery when there is manipulation of the bowel. It can also occur with other procedures due to anesthesia, immobility, opioid pain medication, and previous abdominal surgery. Patients present with nausea and abdominal pain. Interventions include insertion of a nasogastric tube to decompress the stomach to ease nausea and prevent vomiting and aspiration. Patients are kept nothing by mouth, NPO, until bowel motility returns.

### *Urinary System*

Urinary retention can occur due to complications from anesthesia, opioids, and immobility. Anesthesia depresses the nervous system, which can affect the nervous system's control of micturition. This can result in a decreased sensation of a full bladder and urinary retention. Opioids may interfere with the patient's ability to fully empty the bladder. Immobility and bedrest impact the ability to fully relax the perineal structures to allow voiding and complete emptying of the bladder.

### *Integumentary System*

A surgical procedure typically involves an incision through the skin and tissues, disrupting the first barrier to infection, the skin. Surgical-site infection is a risk in the perioperative period more commonly seen in older, immunosuppressed, or malnourished patients and those with longer hospital length of stays. The surgical site will appear red, warm, and edematous, with purulent drainage, and the patient will complain of increased pain—the cardinal signs of inflammation. In the worst-case scenario, the wound may dehisce; the sutures or staples fail, and the wound opens up. The wound must be cleaned and drained. Sterile saline dressings must be maintained until the wound is healthy enough to be reapproximated or resutured. Adequate nutrition is imperative for wound healing.

## NURSING MANAGEMENT

Although postoperative needs are specific to the patient and surgical procedure, there are assessments and interventions that are common to all surgical patients. Case-specific needs are covered in the chapters where specific surgical procedures are discussed. This chapter focuses on common postsurgical needs. These patient assessments and interventions are crucial for safe patient care.

### *Assessment*

- Respiratory status
  *Low oxygen saturation and/or increased respiratory rate and work of breathing could signify a pulmonary embolism (PE), atelectasis, aspiration, or pneumonia. Adventitious lung sounds such as rhonci or diminished or absent sounds could also reveal atelectasis, aspiration, or pneumonia. Rales may indicate fluid overload.*
- Vital signs—blood pressure (BP), heart rate (HR), and temperature: Monitor for trends in values.
  *Deviations from normal vital signs could signify complications. The most common postoperative complication is hypotension and tachycardia due to blood or fluid loss. Hypertension and tachycardia may occur due to the stress response to surgery and pain. Increases in temperature may indicate infection due to pulmonary issues or surgical-site infection.*
- Peripheral perfusion
  *Cool, pale skin with weak pulses and delayed capillary refill may indicate decreased volume and cardiac output.*
- Neurological
  *Decreases in level of consciousness, confusion, agitation, or disorientation may indicate the onset of delirium or POCD. It may also be due to excessive pain medication or respiratory dysfunction. Irregularities in pupillary size and reaction or Glasgow Coma Scale (GCS) score may be due to increased intracranial pressure.*
- GI
  *Bowel sounds, flatus, and bowel movements reflect the return of GI motility. Postoperative nausea and vomiting may be associated with anesthesia. Absent or hypoactive bowel sounds, nausea, and vomiting may indicate paralytic ileus.*
- Genitourinary (GU)
  *Increased urine output in the initial postoperative period may be due to excessive IV fluids given intraoperatively. Decreased urination can result from dehydration or the release of antidiuretic hormone (ADH) and initiation of the RAAS due to stress and surgical fluid losses. Monitor for urinary retention that may be caused by complications from anesthesia, opioids, and immobility. Cloudy urine, tea- or cola-colored urine, and urine with a foul odor are signs of urinary tract infection.*
- Skin/drains
  *Assess surgical incisions and dressings for proximity of closed edges, presence and quality of drainage, and intactness of surrounding skin. Red, warm, edematous tissue with purulent drainage, along with complaints of increased pain, indicates infection. Assess for the presence and staging of any skin breakdown or pressure injuries that may be associated with prolonged positioning in the OR or immobility postoperatively.*
- Drains
  *Assess for excess, bloody, or cloudy drainage. Excessive or bloody drainage may indicate surgical-site bleeding. Cloudy drainage may indicate infection. Absent drainage may indicate a clogged drain.*
- Pain
  *Pain should be monitored and treated. Poorly controlled pain may indicate surgical complications or the need for alternate pain control treatment.*
- Fluid and electrolyte balance; monitoring of glucose levels
  *Fluid retention may occur due to activation of the RAAS and release of ADH in response to stress and dehydration.*

*Hypokalemia, a risk factor for lethal dysrhythmias, and hypernatremias may occur with the activation of the RAAS. Hyperglycemia may occur related to the stress of the surgical experience and is a risk factor for infection because high blood glucose fuels bacterial growth.*

### Actions

- Respiratory care
  *Encourage patient to cough and breathe deeply to facilitate full lung expansion and airway clearance (see Evidence-Based Practice: Incentive Spirometry).*
- Fluid management
  *Maintain IV fluids as ordered to maintain intravascular volume. Start PO fluid as ordered with the return of bowel sounds. Maintain as tolerated/no nausea.*
- Mobility: change position frequently; encourage ambulation as soon as possible.
  *Mobility encourages lung expansion, requires muscle use to prevent atrophy, aids in DVT prevention, helps relieve constipation, aids in pain and fatigue relief, improves mood, reduces anxiety, increases comfort, instills a greater quality of life and independence, and is a factor in decreased length of stay.*
- DVT/venous thromboembolism (VTE) prophylaxis
  *DVTs, when they occur, commonly occur in the posterior calf, with noticeable redness, swelling, heat, and pain. A combination of administering anticoagulants as ordered, encouraging activity, and using compression devices is the most effective means of prevention.*
- Diet management
  *Provide diet as ordered. Nutrition is essential for healing. The progression and type of diet are unique to each type of surgical procedure but, in general, PO fluids and diet are started when bowel sounds return and are maintained as tolerated by the patient.*
- Surgical site and wound management
  *Change dressing as ordered, utilizing proper hand hygiene before and after care and correct use of clean and sterile gloves to prevent surgical-site infections. Provide complete documentation of wound assessment and care.*
- Pressure-injury prevention
  *Prolonged pressure deprives tissues of oxygen and nutrients, causing ulceration. Pressure injuries are most often found over bony prominences. To prevent pressure-injury development, patients should be encouraged to mobilize and adjust their position frequently. Those who are not able to do so should be assisted to turn and reposition every 2 hours. Encourage proper nutrition to promote skin integrity and wound healing.*
- Fall prevention
  *Encourage patients to call for assistance. Most falls happen when patients are trying to do something unassisted and/or without supervision, such as transferring from the chair to the bed or ambulating to the bathroom. Use bed alarms as necessary. Preoperative falls put patients at higher risk for postoperative falls.*
- Managing constipation: administer stool softeners and laxatives as ordered.
  *Constipation in the postoperative patient is a common occurrence due to the effects of anesthesia or other medications (particularly opioids), immobility, or improper hydration. Encourage the patient to ambulate, drink plenty of fluids, and eat a nutritious diet high in fiber. Medications other than or in conjunction with opioids to treat pain should be explored. Stool softeners add water into the bowel; laxatives improve bowel mobility to aid in defecation.*
- Remove the Foley catheter as ordered.
  *Removal of the indwelling Foley catheter helps prevent catheter-associated urinary tract infections (CAUTIs) and reduces the risk of falls by removing a tripping hazard.*

### Teaching

- Unit education
  *Educate the patient on unit routines (e.g., frequency of vital signs and assessments, visitation hours, staff members on the unit), and orient the patient to his or her room (how to work the call bell, how to order food).*
- Safety
  *Topics include standard or isolation precautions, patient identification methods, fall precautions, activity or diet restrictions, and bleeding risk precautions.*
- Discharge education (Box 17.5)
  *Education is essential to ensure that the patient safely transitions to home and avoids readmission to the hospital. Teaching should be done in the presence of a family member or significant other who will help the patient upon returning home.*

## Evidence-Based Practice

### Incentive Spirometry

Incentive spirometers are designed to give the patient visual feedback for deep breathing and lung expansion. The use of incentive spirometry has traditionally been a part of postoperative care, but the American Association of Respiratory Therapists no longer recommends routine, prophylactic use in postoperative patients. The guidelines state that "the use of Airway Clearance Therapy in the setting of atelectasis without retained airway secretions does not seem to be effective." The guidelines suggest early ambulation instead to expand the lungs and promote airway clearance.

Armstrong, C. O. (2017). Post-op incentive spirometry: Why, when, & how. *Nursing, 47*(6), 54–57. doi:10.1097/01.NURSE.0000516223.16649.02

## Box 17.5 Home Discharge Instructions

- Signs and symptoms that need to be reported to the provider immediately
- When and how to take any prescriptions
- Signs and symptoms of infection
- Care of incision and dressings, bathing restrictions
- Activities allowed and prohibited (e.g., driving, exercising, sex, swimming, and weight restrictions)
- Dietary restrictions
- When and where to return for follow-up
- When to return to work/school

*More topics may be necessary to include based on the individual patient needs and the type of surgery performed (e.g., smoking cessation, signs and symptoms of hormonal imbalances, spinal precautions, signs and symptoms of a cerebrospinal fluid leak, or sternal precautions).

# Making Connections

## CASE STUDY: WRAP-UP

Mr. Wells's daughter has come in to visit at his bedside. She is happy that his surgery is over but is very worried about his post-surgical pain. The PACU nurse discusses the PCA pump with her and explains that her father has been resting comfortably and using the pump when needed. His vital signs are stable, and urine output has been good. Because Mr. Wells had bowel surgery, his nasogastric tube has been connected to low continuous suction as ordered by the surgeon. The nurse assesses his abdomen and hears no bowel sounds, but the incision is clean and dry. Soon Mr. Wells meets discharge criteria and is transferred to his inpatient bed.

### *Case Study Questions*

1. The PACU nurse understands that the first priority for Mr. Wells upon admission to the PACU is which of the following?
   A. Informing the family of his status
   B. Checking vital signs and neurological status
   C. Providing pain medication
   D. Assessing the nasogastric tube
2. Initially upon admission, Mr. Wells remains sleepy and hard to arouse. The PACU nurse anticipates an order for which laboratory test?
   A. Glucose level
   B. Arterial blood gas
   C. Lactate level
   D. Liver function test
3. Shortly later, Mr. Wells becomes restless, and his heart rate goes up to 100 bpm. As the nurse assesses him, the priority assessment should include which interventions? *(Select all that apply.)*
   A. Check his dressing and drains for bleeding.
   B. Check his breathing and oxygen saturation.
   C. Check his pain and comfort level.
   D. Check to see if he has to have a bowel movement.
   E. Check his blood pressure and fluid volume status.
4. Before administering pain medication to Mr. Wells, the nurse's assessments include which of the following? *(Select all that apply.)*
   A. Sedation level
   B. Self-report of pain
   C. Vital signs
   D. Bowel sounds
   E. Urine output
5. The PACU nurse supports Mr. Wells's family by doing which of the following? *(Select all that apply.)*
   A. Informing family when the patient arrives in the PACU
   B. Allowing visitation immediately prior to transfer to his inpatient room
   C. Allowing visitation as safety and privacy allow
   D. Providing frequent updates
   E. Providing a visitation policy that allows visitation after discharge from the PACU

## CHAPTER SUMMARY

The transition from anesthesia to recovery carries risks for potentially life-threatening complications. One of the most critical risk factors is that there is a temporary decrease in or loss of consciousness and loss of motor and reflexive control of respiration after anesthesia in the OR, so intense monitoring of respiratory status must occur. Also, the postoperative transition period is the time when many patients experience discomforts such as nausea, vomiting, and pain. During the transition from the OR, patients need assistance to maintain a safe internal physiological balance. Post-anesthesia care units (PACUs) specialize in managing both the potential life-threatening complications and the inevitable discomforts related to recovery from a surgical procedure.

Post-anesthesia care is provided in a variety of settings. They include but are not limited to the inpatient hospital PACU, intensive care unit (ICU), outpatient PACU, and procedure areas such as endoscopy. Examples of surgical

procedures for which patients recover in an inpatient PACU include lung lobectomy, nephrectomy, exploratory laparotomy, and open reduction and internal fixation of fractures. Recovery from complex procedures with a high risk for complication, such as open-heart procedures, craniotomy, and transplantations, is done in an ICU setting. Patients who receive recovery care in an outpatient setting are able to go home the same day as the procedure, as are patients who receive recovery care in a procedure area.

Effective post-anesthesia care nursing requires knowledge of preoperative status, completion of an immediate postoperative assessment, and evaluation of pertinent laboratory and diagnostic studies. Priority assessments include vital signs and temperature; respiratory adequacy; postoperative cardiac status, including peripheral circulation; postoperative neurological status; IV patency; motor abilities and return of sensory and motor control in areas affected by local or regional anesthetics; and skin integrity. Priority interventions include connecting the patient to the monitor, completing the assessment, pain management, and management of nausea and vomiting. The post-anesthesia care nurse should inform the family of the patient's arrival into the PACU setting and allow visiting as soon as the assessment has been completed and the patient has been stabilized. Supporting the patient's family members and involving them in the discharge instructions is essential to recovery in the hospital or at home.

Patients who are transferred to an inpatient unit for continued monitoring and recovery from surgery are susceptible to many of the same complications as patients in the PACU, such as deep vein thrombosis (DVT) or pulmonary embolism (PE), wound infection, atelectasis, or pneumonia, or problems with gastrointestinal motility. The longer length of stay expands on the assessments and interventions done in the PACU, many of which are standard, but many are patient and surgery specific. Standard postoperative care includes assessment, monitoring, facilitating mobility, wound care, and very importantly, patient and family education.




To explore learning resources for this chapter, go to **Davis Advantage** and find:
- Answers to in-text questions
- Chapter Resources and Activities
- NCLEX®-Style Chapter Review Questions
- Bibliography

This is an advanced sample chapter. Uncorrected page proofs may vary upon publication.

# Chapter 26

# Coordinating Care for Patients With Lower Airway Disorders

*Adriana Glenn*

## LEARNING OUTCOMES

**Content in this chapter is designed to assist in:**

1. Describing the epidemiology of lower airway disorders
2. Correlating clinical manifestations to pathophysiological processes of:
   a. Asthma
   b. Chronic obstructive pulmonary disease
   c. Cystic fibrosis
   d. Lung cancer
3. Describing the diagnostic results used to confirm the diagnosis of lower airway disorders
4. Discussing the medical management of:
   a. Asthma
   b. Chronic obstructive pulmonary disease
   c. Cystic fibrosis
   d. Lung cancer
5. Developing a comprehensive plan of nursing care for patients with lower airway disorders
6. Designing a teaching plan that includes pharmacological, dietary, and lifestyle considerations for patients with lower airway disorders

## ESSENTIAL TERMS

**Adjuvant therapy**
**Asthma**
**Bronchiectasis**
**Chronic bronchitis**
**Chronic obstructive pulmonary disease (COPD)**
**Cystic fibrosis**
**Emphysema**
**Exacerbation**
**Forced expiratory volume (FEV)**
**Forced vital capacity (FVC)**
**Neoadjuvant therapy**
**Peak expiratory flow**
**Pursed-lip breathing**
**Spirometry**
**Steatorrhea**
**Tripod position**
**Visual analog dyspnea scale**

## CONCEPTS

- Assessment
- Inflammation
- Medication
- Nursing Roles
- Oxygenation
- pH Regulation

## Finding Connections

### CASE STUDY: EPISODE 1

*Follow this patient throughout the chapter.*

Clifford Davis is a 39-year-old male with a history of asthma who presents to the emergency department with shortness of breath and inability to carry on a conversation. He is assuming a tripod position and exhibits pursed-lip breathing. He has a nonproductive cough. He woke up coughing, followed by chest tightness, which prompted a call to the rescue services. His vital signs are blood pressure (BP), 121/65 mm Hg; heart rate (HR), 150 bpm; respiratory rate (RR), 40. He has audible wheezes bilaterally. He has been a one-pack/day smoker for 15 years.

His medications include:

Hycodan cough elixir 1 to 2 tsp at bedtime (HS)
Zyrtec 5 mg bid
Advair 500/50 1 inhalation bid
Pulmicort Flexhaler 180 mcg bid
Tessalon Perles 200 mg tid
Ventolin 2 puffs prn…

## INTRODUCTION

All lower airway disorders negatively impact oxygenation, ventilation, and gas exchange, thus affecting tissue perfusion. Some lower airway disorders can be chronic and progressive such as asthma, chronic obstructive pulmonary disease (COPD), and cystic fibrosis. Chronic and progressive lower airway disorders require meticulous management and lifestyle adjustments to achieve maximum wellness. Conversely, lung cancer can occur acutely and more often has a very poor 5-year survival rate. Lung cancer requires early detection and aggressive management to achieve maximum wellness. All patients attempting to optimally manage their lower airway disorders require thoughtful nursing care, support, and education.

## ASTHMA

### Epidemiology

Statistics updated in 2017 indicate asthma affects over 18 million Americans, including 6 million children. Approximately 8% of children and 8% of adults have asthma. In adults, it is more common in women than in men. In children, asthma is more common in boys. The rate of asthma among blacks is higher than in other racial or ethnic groups. Multiple-race, American Indian, or Native Alaskan people also have higher rates of asthma. Internationally, estimates of those who suffer from asthma are approximately 300 million people worldwide. This number is expected to increase by more than 100 million by 2025. The risk of death from asthma increases with age. Risk factors include a family history, frequent respiratory infections, eczema, and the presence of allergies such as rhinitis.

### Pathophysiology

**Asthma** is a chronic lung disease characterized by an intermittent, reversible airway obstruction resulting from inflammation of the lung's airways and a tightening of the muscles that surround the airways. The condition affects the bronchial airways, not the alveoli. There is airway obstruction and bronchial hyperresponsiveness. The state of bronchial hyperresponsiveness and underlying inflammation of the small airways is easily triggered by exposure to irritants, exercise, cold weather, or risk factors. Irritants include cigarette smoke, mold, pollen, dust, animal dander, air pollutants, and occupational irritants. Risk factors include viral infections, nasal polyps, allergic rhinitis, food and medication allergies, and emotional stress.

Exposure to triggers produces an inflammatory response. As a part of that immune activation, IgE antibodies bind to receptors on mast cells, causing degranulation and the release of inflammatory mediators, such as histamine and leukotrienes, which cause vasodilation and increase capillary permeability. There is edema of the airways and an increase in basophils, eosinophils, and neutrophils, which stimulate the production of mucus. The resulting thick, tenacious mucus causes a thickening of the airways and bronchial hyperresponsiveness. The release of histamine also causes constriction and spasm of the smooth muscles surrounding the bronchial tubes, causing bronchospasm of the bronchial tubes. The bronchospasms cause further narrowing of the airways. The bronchospasms, mucus production, and edema produce obstruction to the flow of air into and out of the lungs.

### Clinical Manifestations

After exposure to a trigger, the patient exhibits clinical manifestations such as wheezing, dyspnea, coughing, increased sputum, and increased respiratory rate. The patient may also experience chest tightness and tachycardia, which may be secondary to decreased oxygenation or anxiety or a side effect of treatment with bronchodilators. A classic sign of an asthma attack is the inability to speak in full sentences.

### Connection Check 26.1

A patient with asthma presents with which symptoms?

A. Cough, elevated blood pressure
B. Decreased respirations, fatigue
C. Increased respirations, wheezes
D. Increased sputum, decreased respirations

## Management

### *Medical Management*

#### Diagnosis

The diagnosis and assessment of asthma include a detailed patient history, pulmonary function tests, chest x-ray, and pulse oximetry and possibly arterial blood gases (ABGs). The detailed patient history should include childhood illnesses, family history of allergies or asthma, eczema, smoking history, occupational history, and exposure to environmental triggers. Additionally, the patient history should include the frequency of symptoms, whether they are triggered by any specific activity or time (day, evening, spring, or fall), how long the symptoms last, and mechanisms the patient uses to relieve the symptoms. The chest x-ray is needed to rule out any other respiratory conditions and to monitor progressive changes in the chest.

Pulmonary function tests (PFTs) are a predominant feature in evaluating asthma. PFTs are a group of tests used to evaluate the functioning of the respiratory system. Some of the more commonly used PFTs are spirometry, peak expiratory volume, and pulse oximetry. There are other PFTs available for use in confirming a diagnosis of asthma when routinely used tests or exams do not provide a clear diagnosis of asthma.

**Spirometry** is a test that measures airflow and lung volumes, such as the **forced expiratory volume (FEV)**. One of the major tests of pulmonary function is the forced expiratory volume in 1 second ($FEV_1$). The $FEV_1$ measures the amount of air forced out of the lungs after a full inspiration. The volume is measured at 1 second. The measurement is compared to a normal person's predicted volume based on age and gender. A decrease in this test of 15% to 20% below the predicted value for age and gender is diagnostic of asthma. An increase of 12% after administration of a bronchodilator is also diagnostic of asthma.

**Peak expiratory flow** readings measure the maximum airflow expired during a forced expiration. The patient's peak flow readings are compared to the personal best reading with a reading obtained during an **exacerbation** or "asthma attack." Patients are encouraged to monitor their peak flow values. The reading done during an exacerbation as compared to a personal best allows the patient to recognize the severity of the respiratory distress. The patient's asthma action plan (discussed later) is based on the peak flow readings (Box 26.1).

Both noninvasive and invasive methods can be used to obtain oxygen saturation levels in the blood. Pulse oximetry is a noninvasive method of measuring oxygen saturation ($SpO_2$). It can be used to help determine the severity of the respiratory distress. The normal pulse oximetry value is 95% to 100%. Pulse oximetry monitoring detects desaturation of the hemoglobin before the patient exhibits symptoms. Arterial blood gas monitoring is an invasive sampling of arterial blood to measure the oxygenation of the blood ($PaO_2$), acid-base balance, and the partial pressure of carbon dioxide ($PaCO_2$).

$PaO_2$ is an important term and component of ABGs. $PaO_2$ is the partial pressure of oxygen in arterial blood. $PaO_2$ reflects a more accurate measure of oxygen in the arterial blood than $SpO_2$. Once the $PaO_2$ in arterial blood falls below the threshold of 60 mm Hg, there is a steep reduction in $SpO_2$. Although a $PaO_2$ of 60 mm Hg is considered acceptable, a more acceptable range for $PaO_2$ is 80 to 95 mm Hg. Arterial blood gases provide the best information with regard to identifying the patient's response to oxygen and ventilation therapy and medications. Once asthma is diagnosed, the disease is classified based on the frequency and severity of the symptoms. One approach through the Global Initiative for Asthma guidelines identifies the level of control and the treatment recommended for asthma. Asthma is classified as "mild asthma," "moderate asthma," "severe asthma," and "uncontrolled asthma." Asthma severity may be assessed retrospectively through close evaluation of the treatment required to manage symptoms.

### Box 26.1 Patient Education: Peak Flow Meter

#### Use of the Peak Flow Meter

- Before each use, make sure the sliding marker or arrow on the peak flow meter is at the bottom of the numbered scale (zero or the lowest number on the scale).
- Stand up straight. Remove gum or any food from your mouth. Take a deep breath (as deep as you can). Put the mouthpiece of the peak flow meter into your mouth. Close your lips tightly around the mouthpiece. Be sure  breath, blow out as hard and as quickly as possible. Blow a "fast hard blast" rather than "slowly blowing" until you have emptied out nearly all of the air from your lungs.
- The force of the air coming out of your lungs causes the marker to move along the numbered scale. Note the number on a piece of paper.
- Repeat the entire routine three times. (You know you have done the routine correctly when the numbers from all three tries are very close together.)
- Record the highest of the three ratings. Do not calculate the average. This is very important. You cannot breathe out too much when using your peak flow meter, but you can breathe out too little.
- Measure your peak flow at close to the same time each day. You and your healthcare provider can determine the best times. One suggestion is to measure your peak flow rate twice daily between 7 and 9 a.m. and 6 and 8 p.m. You may want to measure your peak flow rate before or after using your medicine. Some people measure peak flow both before and after taking medication. Try to do it the same way each time.
- Keep a chart of your peak flow rates. Discuss the readings with your healthcare provider.

#### Treatment

The patient and healthcare provider develop an asthma action plan, which assists with decision making. The plan provides information and instructions on how the patient can manage his or her asthma based on peak expiratory flow readings, medications, an awareness or recognition of worsening symptoms and when to seek emergency care. The treatment of

asthma includes assessment, monitoring, control of environmental factors, pharmacological treatment, and education. The patient's frequency of symptoms and triggers should be noted. Pulmonary function tests should be conducted regularly to track the patient's response to therapy. During an acute exacerbation, peak flow readings, pulse oximetry, and ABGs (in a very severe attack) are used to determine the severity of the attack. Control of environmental factors is a necessary part of the education program for the patient with asthma. Irritant exposure should be reduced once the irritant has been identified. Patient history or sensitivity testing will often reveal the likely irritant. Environmental smoke is associated with increased symptoms and decreased lung function. Patients should be advised not to smoke and to avoid "second-hand" smoke exposure. The patient should be counseled on the importance of being aware of the levels of air pollution and to avoid outside activities if the level is high. There are many air-monitoring apps available to assist patients in becoming more informed about the air quality in their area. Patients should avoid fumes from wood-burning stoves, fireplaces, aerosol sprays, and strong perfumes. They should also remove animals and/or birds from their home if they are sensitive to the dander. Stress and depression may also be factors that can precipitate an asthma attack.

### Medications

Pharmacological treatment of the patient with asthma is based on the patient's response to previous treatment(s) and the level of engagement in the self-management plan. Patients are seen frequently when they begin a new medication (1–3 months) and when they experience an acute exacerbation (within a week). There are several classifications of medications that are used to treat asthma: anti-inflammatories, bronchodilators, anticholinergics, and leukotriene modifiers.

Anti-inflammatories, typically inhaled corticosteroids, reduce mucus production and swelling, making the airways less sensitive and less likely to react to asthma triggers that cause asthma symptoms. Bronchodilators such as beta$_2$-adrenergic agonists relax the bronchial smooth muscle, helping to open the airway and decreasing obstruction. Anticholinergics are another group of bronchodilators. Different from beta$_2$-adrenergic agonists, which relax the bronchioles or small airways, anticholinergics relax the muscles around the larger airways or bronchi. Leukotriene receptor antagonists are another class of medications that may be used to enhance asthma control if the usual medications are not effective. They are not steroids; they inhibit the leukotriene-mediated inflammatory process.

Medications also fall into two categories: long-term control medications and "rescue" medications. Long-term control medications are used daily regardless of the symptoms a patient is experiencing to achieve and maintain control of the asthma. The most effective long-term control medications for asthma are inhaled anti-inflammatories. Another long term control medication option for poorly controlled asthma or when inhaled gluccocorticoids are difficult to manage, such as in young children, is oral theophylline, a bronchodilator with anti-inflammatory effects. "Rescue" medications are those medications used once an asthma attack has started; these are usually short-acting bronchodilators. Short-acting beta$_2$-adrenergic agonists are the gold standard because they are most effective. Short-acting beta$_2$-adrenergic agonists should be used for acute exacerbations of asthma only. Studies have shown that regular use of short-acting beta$_2$-adrenergic agonists results in more frequent and earlier exacerbations, tolerance, decreased baseline pulmonary function, and increased hyperresponsiveness. Oral anti-inflammatories such as prednisone may also be used in an acute exacerbation. As the attack subsides, oral anti-inflammatory medications are not abruptly stopped but decreased in dosage until they are discontinued.

New medications for poorly controlled asthma include anti-interleukin 5 (anti-IL5) and anti-immunoglobulin-E (anti-IgE) therapy. Anti-IL5 medications reduce the production and survival of eosinophils involved in the asthma attack. Anti-IgE medications help prevent the inflammatory response in allergic asthma. Figure 26.1 illustrates a stepwise approach to the treatment of asthma.

### Complications

Status asthmaticus is an acute exacerbation of asthma that is unresponsive to repeated doses or treatment with the typical rescue medications (bronchodilators). It can vary from mild to severe with bronchospasm, inflammation, and excessive mucus production with mucus plugging. Patients report chest tightness, wheezing, dry cough, shortness of breath, and severe respiratory distress. This results in carbon dioxide retention, hypoxemia, and ultimately respiratory failure. Typical triggers include the recent onset of a viral respiratory illness, exposure to a potent irritant or allergen, or exercising in the cold.

Status asthmaticus is a life-threatening emergency requiring a prompt medical response. Treatment includes oxygen, IV fluids, systemic bronchodilators, and steroids to open the airways and decrease inflammation. Endotracheal intubation may be necessary in severe cases until symptoms are under control.

**Safety Alert**

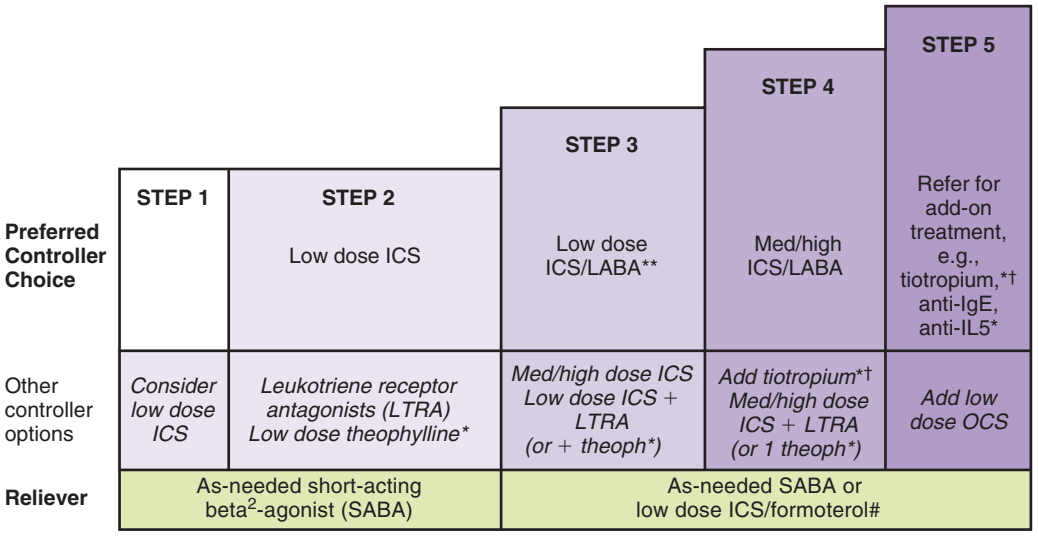
- Absent or diminished breath sounds signify a decrease in the movement of air due to increased obstruction or respiratory exhaustion.
- If a patient's wheezing decreases and he or she has little or no breath sounds, this indicates the patient is not able to move air throughout the system. This is a medical emergency! It indicates respiratory failure. The patient may require mechanical ventilation.

## *Nursing Management*

### Assessment and Analysis

The symptoms the patient exhibits during an asthmatic attack are related to airway obstruction. These symptoms include:

- Dyspnea
- Use of accessory muscles of respiration




*Not for children <12 years
**For children 6–11 years, the preferred Step 3 treatment is medium dose ICS
#For patients prescribed BDP/formoterol or BUD/formoterol maintenance and reliever therapy
†Tiotropium by mist inhaler is an add-on treatment for patients ≥12 years with a history of exacerbations

**FIGURE 26.1** Stepwise approach for asthma treatment.
*Key: ICS, inhaled corticosteroid; LABA, long acting inhaled beta2 agonist; SABA, short acting inhaled beta2 agonist; LTRA, leukotriene receptor antagonist; OCS, systemic oral corticosteroid; anti-IgE , anti-immunoglobulin E; anti-IL5, anti-interluekin 5; tiotropium = anticholinergic drug; theophylline = broncodilator; BDP/formoterol = combined LABA and ICS*

- Wheezes
- Elevated pulse
- Elevated blood pressure
- Increased anxiety
- Inability to lie flat
- Inability to talk in complete sentences
- Decreased peak flow readings

## Nursing Diagnoses

- **Ineffective airway clearance** related to increased mucus production, bronchospasm, fatigue
- **Impaired gas exchange** related to dyspnea, fatigue
- **Ineffective breathing pattern** related to anxiety

## Nursing Interventions

### *Assessments*

- Vital signs—pulse rate, temperature, respiratory rate, peak flow measurement
  *Increased pulse rate may be a sign of poor oxygenation or anxiety or a side effect of treatment with bronchodilators; increased temperature is a sign of infection; a respiratory rate greater than 30 breaths per minute is due to increased anxiety and increased work of breathing due to bronchial constriction; peak flow values indicate the severity of the asthma attack and help monitor recovery.*
- Oxygen saturation
  *Oxygen saturation of less than 90% indicates significant oxygenation problems. The goal is to maintain the $SpO_2$ at 90% or above. Hypoxemia causes restlessness, anxiety, and increased blood pressure and pulse rate.*
- Arterial blood gas
  *The patient initially exhibits respiratory alkalosis caused by hyperventilation (decreased $PaCO_2$). As respiratory difficulty increases, respiratory acidosis develops (increased $PaCO_2$).*
- Breath sounds
  *The presence of wheezing indicates narrowing of the airway—expiratory first, then inspiratory. Absent or diminished breath sounds signify a decrease in the movement of air due to increased obstruction or respiratory exhaustion.*
- Level of consciousness
  *Changes in level of consciousness are indicators of hypoxemia.*
- Ability to speak in full sentences
  *This demonstrates the ability to move air throughout the tracheobronchial tree; inability to speak in full sentences is an indicator of respiratory distress.*
- Cough
  *Irritation causes stimulation of the cough receptors.*
- Use of accessory muscles
  *Use of accessory muscles demonstrates respiratory fatigue.*
- Position—**tripod position** (sitting upright with arms propped on a table) or semi-Fowler's position
  *The patient may assume the tripod position in an attempt to decrease the work of breathing.*
- Monitor dyspnea
  *Use of the* **visual analog dyspnea scale** *allows the patient to identify his or her own level of dyspnea because dyspnea is a subjective experience (Fig. 26.2).*
- Previous intubation
  *The need for intubation in past asthma attacks is an indicator of severity.*

### *Actions*

- Provide oxygen.
  *Increase $SpO_2$ to 90% or greater.*

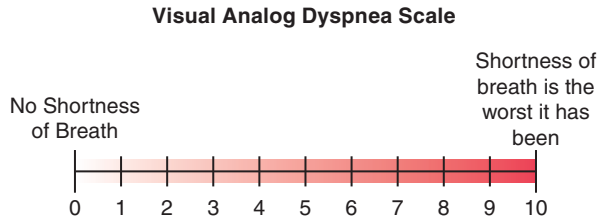



**FIGURE 26.2** The visual analog dyspnea scale is a line that assesses the patient's degree of dyspnea. It is a 100-mm line that starts with "No shortness of breath" at one end and "Shortness of Breath is the worst it has been" on the opposite end. Only the patient can identify his or her perception of the dyspnea because dyspnea is a subjective experience. The patient identifies his or her dyspnea on the scale verbally by holding up his or her fingers or pointing to a point on the line. After treatment, the patient is reassessed using the same visual analog dyspnea scale.

- Administer bronchodilators as ordered.
  *Bronchial smooth muscle relaxants help open the airway.*
- Administer anti-inflammatory medication/steroids as ordered.
  *Anti-inflammatory medication decreases the inflammation causing the airway obstruction.*
- Administer anticholinergics as ordered.
  *Anticholinergics relax the muscles around the larger airways or bronchi.*

### *Teaching*

- Provide the patient with an individualized written asthma action plan (Fig. 26.3) that includes daily management of asthma and how to recognize symptoms of exacerbations.
  *Control of asthma over time requires regular assessment and consistent management.*
- Avoidance of risk factors
  *Identify factors that trigger an attack.*
- Pursed-lip breathing
  **Pursed-lip breathing** *keeps the airways open longer and prolongs exhalation, allowing increased time for oxygen and carbon dioxide exchange.*
- Medication education
  *Control symptoms and manage disease. Oral steroids used during an exacerbation should be tapered, not abruptly discontinued, to avoid adrenal insufficiency.*
- Peak flow meter (see Box 26.1)
  *Monitor pulmonary status—establish a baseline and reassess during an acute exacerbation to determine the severity of respiratory distress.*
- Smoking cessation
  *Smoking is the leading cause of pulmonary disease.*
- Proper inhaler technique (Box 26.2)
  *Proper technique ensures maximum effectiveness of the inhaled medication. If the patient has trouble coordinating the inhalation and exhalation necessary for proper inhaler technique, recommend the use of an aerochamber.*
- Cleaning of respiratory equipment
  *Peak flow meters, nebulizers, metered-dose inhalers (MDIs), and aerochambers must be kept clean to prevent infections.*

### Evaluating Care Outcomes

A well-managed patient with asthma has decreased visits to the emergency department and relies on the use of "rescue" medications less often. The patient has minimal symptoms during the day and night. Supporting positive patient outcomes requires the patient to have adequate knowledge to manage his or her disease. The patient uses control medications as ordered and limits or avoids exposure to the irritants triggering asthma exacerbation. The patient ceases smoking, makes the home and environment as "allergy-free" as possible, monitors peak flow readings twice a day, and adheres to the asthma management plan. When the patient follows the treatment plan, the patient delays the progression of the asthma, experiences fewer exacerbations, and enjoys longer durations of being asymptomatic.

**CASE STUDY: EPISODE 2**

Clifford's $SpO_2$ reading upon arrival in the emergency department is 88%. He is started on nasal oxygen, which improves his saturation up to 96%. He is given prednisone by mouth after determining he has not taken his daily dose of anti-inflammatory medication. His peak flow reading is lower than his normal baseline. He is started on the first of three albuterol nebulizer treatments. His $SpO_2$ level maintains at 96%. He remains short of breath and tachycardic, with a heart rate of 135 bpm…

## CHRONIC OBSTRUCTIVE PULMONARY DISEASE

### Epidemiology

**Chronic obstructive pulmonary disease (COPD)** is composed of two diseases: emphysema and chronic bronchitis. It is the fourth-leading cause of chronic morbidity and mortality in the United States. COPD is projected to be the third-leading cause of death by 2020. Additionally, it is projected to rank fifth in 2020 in diseases worldwide. In 2014, almost 16 million people in the United States 18 years and older were diagnosed with COPD, and another 12 million adults are thought to have undiagnosed COPD based on low pulmonary function tests. The prevalence of COPD is higher among women and Caucasians. The Centers for Disease Control and Prevention (CDC) reports that American Indians/Alaskan Natives and multiracial non-Hispanics, those with less than a high school education, current or former smokers, and people with a history of asthma have an increased incidence of COPD. The highest rates of COPD are found in the Southeast and Midwest regions of the United States (Kentucky, Tennessee, Mississippi, and Alabama) and Puerto Rico.

Cigarette smoking is the primary cause of COPD. Approximately 80% to 90% of COPD deaths are caused by smoking. Other risk factors include occupational dust and chemicals, outdoor air pollution, and second-hand smoke.

**Asthma Action Plan**

For:_____ Doctor:_____ Date:_____

Doctor's Phone Number:_____ Hospital/Emergency Department Phone Number:_____

**GREEN ZONE**

**Doing Well**

- No cough, wheeze, chest tightness, or shortness of breath during the day or night
- Can do usual activities

**And, if a peak flow meter is used,**

**Peak flow:** more than _____ (80 percent or more of my best peak flow)

My best peak flow is:_____

Take these long-term control medicines each day (include an anti-inflammatory).

| Medicine → | How much to take → | When to take it |
|---|---|---|
| | | |

Before exercise ☐ _____ ☐ 2 or ☐ 4 puffs_____ 5 minutes before exercise

**YELLOW ZONE**

**Asthma is Getting Worse**

- Cough, wheeze, chest tightness, or shortness of breath, or
- Waking at night due to asthma, or
- Can do some, but not all, usual activities

**-Or-**

**Peak flow:** _____ to _____ (50 to 79 percent of my best peak flow)

**First →** **Add: quick-relief medicine—and keep taking your GREEN ZONE medicine.**

_____ ☐ 2 or ☐ 4 puffs, every 20 minutes for up to 1 hour

(short-acting beta$_2$-agonist) ☐ Nebulizer, once

**Second →** **If your symptoms (and peak flow, if used) return to GREEN ZONE after 1 hour of above treatment:**

☐ Continue monitoring to be sure you stay in the green zone.

**-OR-**

**If your symptoms (and peak flow, if used) do not return to GREEN ZONE after 1 hour of above treatment:**

☐ Take:_____ ☐ 2 or ☐ 4 puffs or ☐ Nebulizer

(short-acting beta$_2$-agonist)

☐ Add:_____ mg per day For _____ (3–10) days

(oral steroid)

☐ Call the doctor ☐ before/ ☐ within _____ hours after taking the oral steroid.

**RED ZONE**

**Medical Alert!**

- Very short of breath, or shortness of breath, or
- Quick-relief medicines have not helped, or
- Cannot do usual activities, or
- Symptoms are same or get worse after 24 hours in yellow zone

**-Or-**

**Peak flow:** less than _____ (50 percent of my best peak flow)

**Take this medicine:**

☐ _____ ☐ 4 or ☐ 6 puffs or ☐ Nebulizer

(short-acting beta$_2$-agonist)

☐ _____ mg

(oral steroid)

**Then call your doctor NOW.** Go to the hospital or call an ambulance if:

- You are still in the red zone after 15 minutes AND
- You have not reached your doctor.

**DANGER SIGNS**

- **Trouble walking and talking due to shortness of breath**
- **Lips or fingernails are blue**

→

- **Take ☐ 4 or ☐ 6 puffs of your quick-relief medicine AND**
- **Go to the hospital or call for an ambulance _____ NOW!**

(phone)

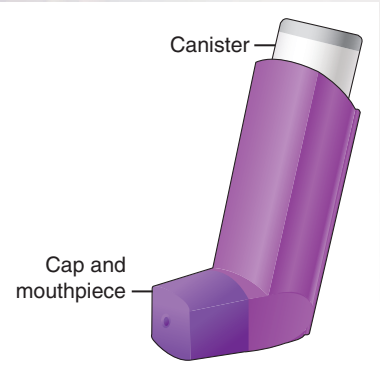
**FIGURE 26.3** Sample asthma control plan.

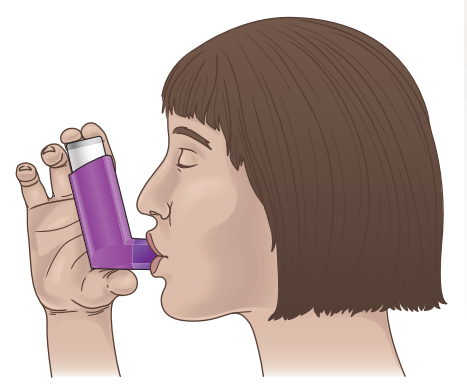
Fewer than 5% of all COPD cases are caused by a deficiency of an enzyme called alpha-1 antitrypsin (AAT). AAT is produced in the liver and is present in the lungs. When present, it has lung-protectant properties. When deficient, there is an increased risk of developing emphysema. Both parents must carry the defective gene to increase the risk of deficient AAT. About 100,000 Americans have the AAT deficiency. Alpha-1 antitrypsin deficiency should be considered if a young person develops emphysema and has no history of smoking or exposure to smoke.

## Box 26.2 Patient Education: Use of Metered-Dose Inhaler and Aerochamber

### Use of the Metered-Dose Inhaler (MDI)

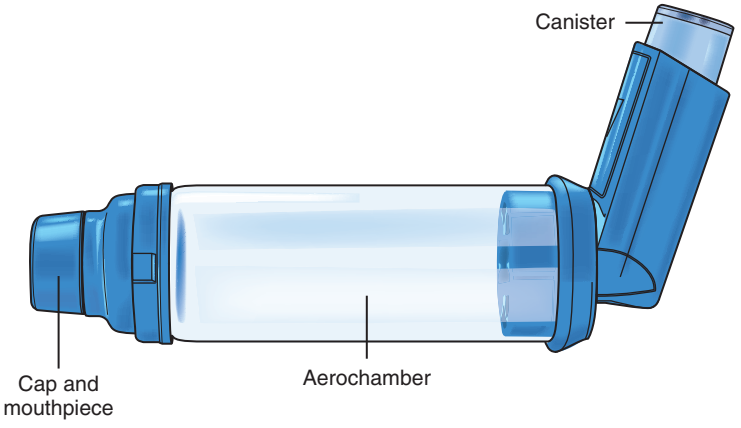
1. Remove the cap and shake the inhaler.
2. Breathe out gently.
3. Put the mouthpiece in your mouth, and at the start of inspiration, which should be slow and deep, press the canister down and continue to inhale deeply.
4. Hold the breath for 10 seconds or as long as possible, then breathe out slowly.
5. Wait for about a minute or as directed by your healthcare provider before repeating steps 2 through 4; if using a corticosteroid MDI, rinse mouth upon completion of doses.
6. Replace the cap on the MDI.

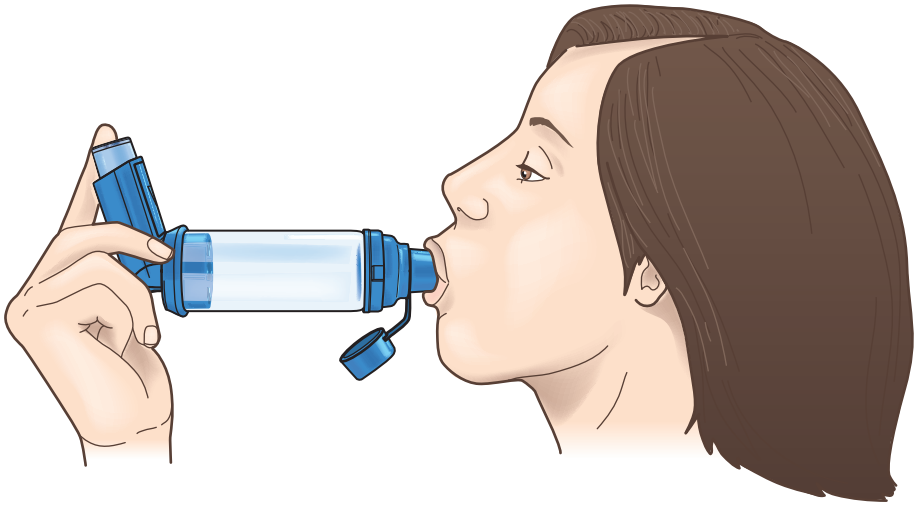


### Use of the Aerochamber

1. Remove cap from the MDI.
2. Shake inhaler and insert in back of aerochamber (opposite of the mouthpiece).
3. Breath out completely and place mouthpiece of the chamber in your mouth and seal lips tightly around it.
4. Press canister once to release a dose of the medication.
5. Take a deep, slow breath in. (If you hear a whistling sound, you are breathing in too quickly.)
6. Hold breath for about 10 seconds (count slowly), and then breathe out through the mouthpiece.
7. Breathe in again but do not press canister.
8. Remove mouthpiece from mouth and breathe out.
9. Wait for about a minute or as directed by your healthcare provider before repeating steps 2 through 8; if using a corticosteroid MDI, rinse mouth upon completion of doses.
10. Replace the cap on the MDI.



## Pathophysiology

Chronic obstructive pulmonary disease is characterized by airflow limitations. The airflow limitation is progressive and is associated with an abnormal inflammatory response of the lung to noxious particles or gases. Both diseases in COPD cause obstruction to the airflow but in different ways (Fig. 26.4). **Emphysema** is a disease caused by the destruction of the alveoli. **Chronic bronchitis** affects the small airways and is defined as the presence of cough and sputum production for at least 3 months in each of 2 consecutive years. Thus, the chronic airflow limitation is caused by a mixture of small-airway disease and destruction of the lung tissue.

The patient with emphysema loses lung elasticity and develops hyperinflation of the alveoli. Inhaled pollutants (smoke, dust, chemicals, air pollution) result in the breakdown of elastin, which causes the alveoli to lose their elasticity and thus effective elastic recoil after exhalation. The small airways collapse prematurely, causing trapping of air in the alveoli and subsequent distention. Carbon dioxide cannot leave the alveoli, and oxygen cannot enter, resulting in an ineffective exchange of oxygen and carbon dioxide. The patient is hypoxemic, as evidenced by a low $SpO_2$ and $PaO_2$ (partial pressure of oxygen), and has carbon dioxide retention and chronic respiratory acidosis.

Chronic bronchitis is caused by inflammation of the bronchi and bronchioles by chronic exposure to smoke and environmental irritants. The inflammation causes an increase in the production of mucus cells, which produce a large amount of thick mucus. The walls of the bronchus thicken, causing airway obstruction. The smaller airways are usually affected before the larger airways. Also identified is an asthma-COPD overlap syndrome (ACOS) which significantly impacts disease trajectory and quality of life (see Evidence-Based Practice).

## Clinical Manifestations

Clinical manifestations of the disease include increased work of breathing and shortness of breath. COPD is evidenced by the use of accessory muscles and the patient assuming the tripod position to help ease the work of breathing. The patient with emphysema often appears thin and has a "barrel chest," in which the ratio of the anteroposterior (AP) diameter to the transverse diameter of the chest is 2:2 rather than the normal ratio of 1:2. Patients with emphysema sometimes have a reddish complexion and appear to be puffing when breathing; hence, they may be referred to as a "pink puffer." Conversely, patients with chronic bronchitis are typically obese, have hypoxemia, and appear cyanotic and thus may be referred to as a "blue bloater"; they also have excessive mucus production with a productive cough. Additionally, patients with COPD are at risk for right heart failure due to chronic pulmonary hypertension resulting in right ventricular enlargement. This is referred to as cor pulmonale. Table 26.1 shows a comparison of chronic bronchitis, emphysema, and asthma.

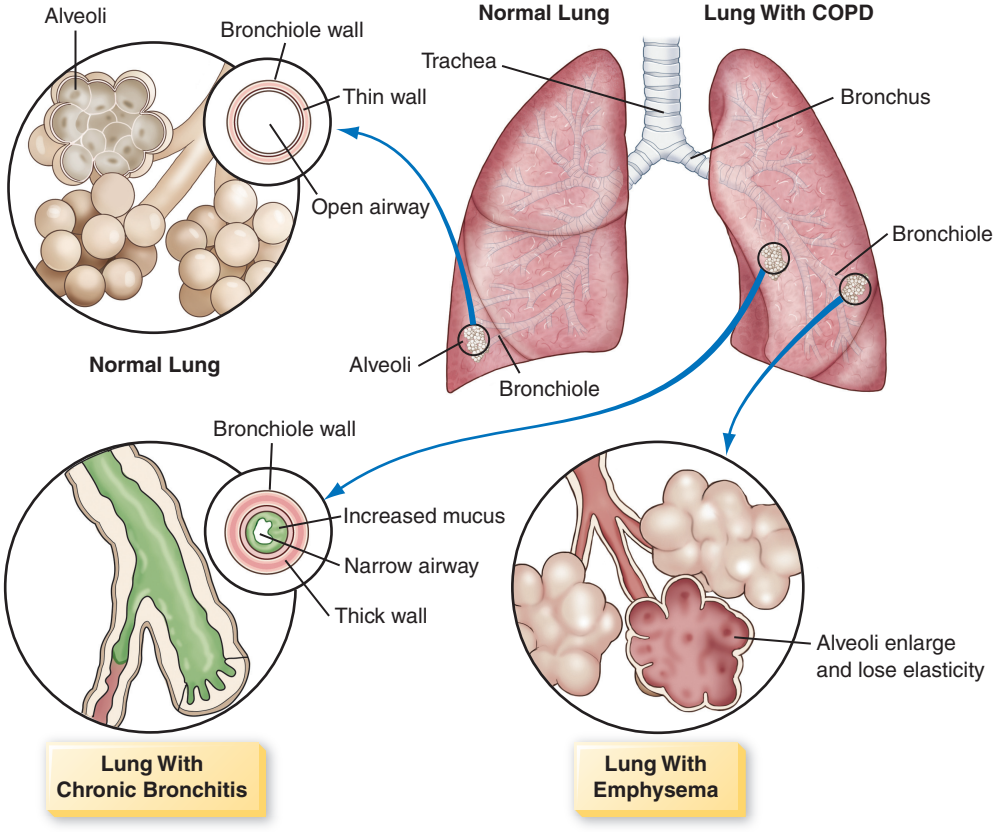



**FIGURE 26.4** A normal lung versus a lung with COPD.

## Evidence-Based Practice

### ACOS

The term *asthma–COPD overlap syndrome (ACOS)* has been used to describe adults presenting with symptoms of both asthma and COPD. The prevalence rate is highly variable, from 15% to 55% depending on age and gender. These patients experience frequent exacerbations and a more rapid decline in lung function, with a correspondingly high mortality rate. They also consume a higher volume of healthcare resources than patients with COPD or asthma alone. There is a self-reported poor quality of life. Recognition of this diagnosis is key to successful management. The goals of treatment are similar to the goals for asthma and COPD: reduce exposure to risk factors, maintain lung function while reducing symptoms, prevent exacerbations, and maintain normal activity. Mainstays of treatment include anti-inflammatory medications and long-acting and short-acting rescue bronchodilators. Smoking cessation is essential.

Ding, B., & Small, M. (2017). Treatment trends in patients with asthma–COPD overlap syndrome in a COPD cohort: Findings from a real-world survey. *International Journal of Chronic Obstructive Pulmonary Disease, 12,* 1753–1763. doi:10.2147/COPD.S136314

Global Initiative for Chronic Obstructive Lung Disease. (2015). *Asthma-COPD overlap syndrome*. Retrieved from http://www.goldcopd.org/uploads/users/files/AsthmaCOPDOverlap.pdf

COPD is characterized by exacerbations occurring after exposure to pollutants such as smoke or respiratory infections such as a cold or flu. An exacerbation is a change in the natural course of the disease evidenced by a variation from the patient's daily baseline symptoms of dyspnea, cough, and/or sputum production. Exacerbations are typically acute in onset and may indicate the need for a change in usual patient management. Warning signs of an exacerbation include increasing shortness of breath, wheezing, more frequent or severe cough, anxiety, problems with sleep, and decreased appetite.

## Management

### *Medical Management*

#### Diagnosis

The diagnosis of COPD is based on patient history, physical assessment, and spirometry. Generally, a chest x-ray is obtained to rule out other causes of respiratory distress. A computed tomography (CT) scan may be considered when the lungs need to be viewed in more detail. Pulmonary function tests also aid in diagnosis. The most commonly performed pulmonary function test (PFT) is spirometry. Spirometry is the measurement of lung volumes and airflow. The two tests done by spirometry are **forced vital capacity (FVC)** and forced expiratory volume in 1 second ($FEV_1$). Forced vital capacity is the maximum volume of air exhaled during a forced expiration; $FEV_1$ is the volume of air expired in the first second of maximal expiration after a maximal inspiration. It is a measurement of the lung's ability to empty quickly. Diagnosis is based on both the

**Table 26.1 Comparison of COPD (Emphysema and Bronchitis) and Asthma**

| | Emphysema ("Pink Puffer") | Bronchitis ("Blue Bloater") | Asthma |
|---|---|---|---|
| ***Risk factors*** | Smoking history<br>Occupational exposure<br>Environmental exposure<br>Alpha-1 antitrypsin deficiency | Smoking history<br>Occupational exposure<br>Environmental exposure | Smoking<br>Family history of asthma<br>Allergies<br>Obesity/overweight<br>Exposure to "second-hand" smoke |
| ***Health history*** | Exposure to "second-hand" smoke<br>Smoking | Exposure to "second-hand" smoke<br>Smoking | Exposure to "second-hand" smoke<br>Smoking<br>Rhinitis<br>Eczema |
| ***Symptoms*** | Slow, progressive<br>Continuous | Slow, progressive<br>Continuous | Intermittent |
| ***Dyspnea*** | Progressive on exertion | Progressive | Present during exacerbations |
| ***Sputum production*** | Often present | Present for at least 3 months for 2 consecutive years | Present during exacerbations |

**Table 26.1 Comparison of COPD (Emphysema and Bronchitis) and Asthma—cont'd**

| | Emphysema ("Pink Puffer") | Bronchitis ("Blue Bloater") | Asthma |
|---|---|---|---|
| ***Bronchospasms*** | Premature closing of the airways with "air trapping" | Obstruction by thick, tenacious mucus | Airflow obstruction by inflammation and mucus |
| ***Reversible*** | Nonreversible | Nonreversible | Reversible |
| ***Airway affected*** | Alveoli are affected | Airways are affected | Airways are affected |

value of $FEV_1$ and $FEV_1/FVC$. Using normal values for the sex, age, and height of the patient, the $FEV_1$ is measured, then calculated as a percentage of a normal value. The $FEV_1/FVC$ is computed as a percentage of normal. Patients with COPD show a decrease in both the $FEV_1$ and the $FEV_1/FVC$.

Chronic obstructive pulmonary disease is a progressive disease. As the disease progresses, $FEV_1$ and $FEV_1/FVC$ deteriorate, and exacerbations become more frequent and life threatening. The severity and progression of the disease correlate to the degree of abnormality of the tests. The Global Initiative for Obstructive Lung Disease has identified stages or grades of the disease: Grade I, mild; Grade II, moderate; Grade III, severe; and Grade IV, very severe. Table 26.2 describes the grades of COPD.

## Treatment

The management plan for COPD has four goals: assess and monitor the disease, reduce modifiable risk factors, manage stable COPD, and manage exacerbations. Assessment includes regular pulmonary function tests and chest x-rays with an exacerbation to identify other thoracic abnormalities or progressive changes within the structure of the lungs. Additional important biological measurements in the COPD management plan include pulse oximetry ($SpO_2$) to determine the severity of hypoxemia during an exacerbation and ABGs to measure the lungs' ability to clear carbon dioxide, as evidenced by $PaCO_2$ and acid-base balance. The ABGs also evaluate oxygenation through $PaO_2$ values and help identify the patient's response to oxygen therapy and medications. Finally, sputum cultures are assessed to identify organisms causing an infectious trigger to an exacerbation.

Reducing modifiable risk factors includes, if possible, decreasing or eliminating exposure to chemicals, dust, and air pollutants, especially smoke. The single most important modifiable risk factor is smoking cessation. Managing stable COPD includes health education regarding the risks and the warning signs of an exacerbation, oxygen therapy, moderate exercise as tolerated, and the mainstay of medical management: medications.

The cornerstone of pharmacological management is bronchodilators: $beta_2$-adrenergic agonists and anticholinergics used individually or in combination on an as-needed or regular basis to control symptoms. A way to evaluate the effectiveness of treatment and determine a course of therapy is to administer a bronchodilator treatment after the initial spirometry and then repeat the test. This approach helps determine how the lungs respond to the bronchodilator or how the pulmonary obstruction is reversed with the medication. Medication management progresses as the disease progresses and begins with inhaled bronchodilators on an as-needed basis. As the disease

**Table 26.2 Gold Criteria for COPD Severity**

In patients with $FEV_1/FVC$ less than 0.70:

| COPD Grade | Spirometry Values | Clinical Manifestations |
|---|---|---|
| ***Gold I Mild*** | $FEV_1$ greater than or equal to 80% of predicted normal value | Patient usually unaware of presence of disease |
| ***Gold II Moderate*** | $FEV_1$ 50% to 79% of predicted normal value | Progressive shortness of breath with exertion |
| ***GOLD III Severe*** | $FEV_1$ 30% to 49% of predicted normal value | Worsening shortness of breath<br>Frequent COPD exacerbations |
| ***GOLD IV Very Severe*** | $FEV_1$ less than 30% of predicted normal value | Shortness of breath extreme, impairing quality of life<br>COPD exacerbations life threatening |

*COPD* = Chronic obstructive pulmonary disease; *$FEV_1$* = forced expiratory volume at 1 second; *FVC* = forced vital capacity.

worsens, long-term bronchodilators are added. Inhaled glucocorticoids are added when and if the patient experiences frequent exacerbations.

Identifying and quickly managing exacerbations is essential because they can dramatically impair pulmonary function and accelerate disease progression. Inhaled bronchodilators and oral glucocorticoids are used, as well as antibiotics if the cause of the exacerbation is infection. Noninvasive positive-pressure ventilation can be used to improve oxygenation and ventilation as well as reduce the need for endotracheal intubation and ventilation.

### Complications

A complication of COPD is secondary spontaneous pneumothorax (SSP). SSP is a spontaneous pneumothorax that occurs in patients with underlying lung disease. Of all cases of SSP, 50% to 70% are attributed to COPD. It is typically caused by the rupture of the hyperinflated alveoli or blebs. Patients present with dyspnea and chest pain. The presentation is more severe than in primary spontaneous pneumothorax—spontaneous pneumothorax without underlying lung disease—due to the already-existing pulmonary dysfunction. Treatment priorities include supplemental oxygenation and chest tube placement to remove air from the pleural space to allow re-expansion of the affected lung. Care of the patient with a chest tube is discussed in Chapter 27.

## Nursing Management

### Assessment and Analysis

The clinical manifestations presented by the patient are due to increased airway resistance, increased work of breathing, and increased sputum production. They include:

- Cough
- Increased sputum production
- Dyspnea
- Use of accessory muscles
- Tripod positioning
- Inability to talk in full sentences
- Pursed-lip breathing
- Changes in skin coloring
- Anxiety

### Nursing Diagnoses

- **Impaired gas exchange** related to altered oxygen delivery and alveoli destruction
- **Ineffective airway clearance** related to decreased energy, dyspnea, ineffective cough
- **Activity intolerance** related to fatigue and dyspnea
- **Anxiety** related to breathlessness

### Nursing Interventions

#### *Assessments*

- Oxygen saturation
  *An $SpO_2$ of less than 90% indicates a significant oxygenation problem. The goal is to maintain the $SpO_2$ at 90% or above.*
- Respiratory rate
  *Monitor respiratory rate to avoid hypoventilation—the respiratory drive in COPD is hypoxemia, not hypercapnia. See Safety Alert.*
- Breath sounds
  *The presence of crackles and wheezes may indicate airway obstruction. Crackles indicate the premature closing of the airways.*
- Pursed-lip breathing
  *Patients with COPD display pursed-lip breathing to keep the airways open longer and prolong exhalation, allowing for increased time for oxygen and carbon dioxide exchange.*
- Cough
  *Cough is a cardinal sign of pulmonary disease. It is a protective mechanism for the tracheobronchial tree.*
- Temperature
  *Increased temperature is a sign of an infectious trigger.*
- Dyspnea
  *Use of the visual analog dyspnea scale allows the patient to identify his or her own level of dyspnea because dyspnea is a subjective experience.*
- Weight
  *Monitoring weight identifies nutritional deficiencies—with prolonged increased work of breathing and decreased energy, the ability to eat decreases.*

#### *Actions*

- Administer bronchodilators as ordered.
  *Bronchodilators are bronchial smooth muscle relaxants that help open the airway. Beta$_2$-agonists (short-acting beta-agonists [SABAs] and long-acting beta-agonists [LABAs]) relax the smooth muscles of the airway by stimulating beta-adrenergic receptors, resulting in antagonism to bronchoconstriction. Anticholinergics relax and enlarge the airways in the lungs, making breathing easier. Anticholinergics can also protect the airways from bronchospasm and may reduce the amount of mucus produced by the airways.*
- Provide oxygen.
  *Increase the $SpO_2$ to 90%. Patients may be placed on continuous oxygen therapy if the $SpO_2$ is less than or equal to 88% or the $PaO_2$ is less than or equal to 60 mm Hg.*
- Position—semi-Fowler's
  *The semi-Fowler's position increases oxygenation by allowing adequate lung expansion.*
- Provide small, frequent meals with dietary supplements.
  *Small, frequent meals take less energy to consume and avoid excessive pressure on the diaphragm that may be associated with a large meal.*

#### *Teaching*

- Breathing techniques—pursed-lip breathing (Box 26.3)
  *Pursed-lip breathing keeps the airways open longer and prolongs exhalation, allowing for increased time for oxygen and carbon dioxide exchange.*
- Pacing of activities
  *Pacing decreases the work of breathing and conserves energy.*

### Box 26.3 Pursed-Lip Breathing (PLB)

- Sit upright with neck and shoulders relaxed.
- Inhale through the nose slowly, counting "one, two."
- Exhale through pursed lips as if you were blowing out a candle, slowly counting "one, two, three, four."
- Exhalation should be twice as long as inhalation.
- Continue PLB until shortness of breath is controlled.

- Smoking cessation program
  *Smoking cessation is key to managing COPD and can change the course of the disease process.*
- Nutritional needs
  *Small, frequent meals decrease the work of breathing with less impact on the diaphragm.*
- Medication regimen
  *Knowledge regarding medications and their use; proper use of inhalers*
- Vaccine prophylaxis
  *Pneumococcal vaccination and an annual flu vaccine decrease the risk of disease exacerbations due to respiratory infections.*
- Recognition of symptoms of exacerbation
  *The patient and family should be aware of signs that signify the patient's respiratory system is more impaired.*
- Coping strategies
  *The patient and family should be aware of the lifestyle changes that may occur because of COPD. These include an inability to maintain an active lifestyle, an inability to care for oneself, depression, denial, and social isolation. Strong support and effective coping strategies are essential to managing the life changes.*

**Safety Alert** If a patient with COPD experiencing an exacerbation is on oxygen therapy, $SpO_2$ and respiratory rate must be monitored continuously until the condition is stabilized. If the patient is receiving too much oxygen, it may "blunt" the respiratory drive. The respiratory effort in a patient with COPD is triggered by the decrease in oxygen, not an increase in carbon dioxide, which is different from the patient with healthy lungs. Therefore, too much oxygen and high $PaO_2$ and $SpO_2$ may cause a decreased respiratory effort.

### Evaluating Care Outcomes

A well-managed patient with COPD has decreased visits to the emergency department and fewer hospitalizations. A critical aspect of supporting patients in managing the disease is making sure the patient has adequate knowledge regarding COPD management. Medications should be taken as ordered, and avoiding or reducing exposure to people with colds or flu that may increase the risk of exacerbations is key. The patient should cease smoking and maintain healthy dietary habits by eating small, frequent meals.

### Connection Check 26.2

What is the primary difference between emphysema and chronic bronchitis?

A. Chronic bronchitis predominately affects the large airways.
B. Emphysema predominately affects the large airways.
C. Emphysema predominately affects the alveoli.
D. Chronic bronchitis predominately affects the alveoli.

## CYSTIC FIBROSIS

### Epidemiology

**Cystic fibrosis** is an inherited chronic disease that affects the lungs and digestive system. About 30,000 children and adults in the United States are affected with cystic fibrosis, with an estimated 1,000 new cases annually. There are approximately 70,000 affected individuals worldwide. Seventy percent of patients with cystic fibrosis are diagnosed by their second year of life. The disease most commonly affects Caucasians of North European descent. Males and females are equally affected. Blacks, Hispanics, Latinos, Asian Americans, and American Indians have lower incidence rates of cystic fibrosis. More than 10 million Americans are carriers of the defective cystic fibrosis gene.

Cystic fibrosis is the second most common life-shortening disorder occurring in childhood in the United States. The survival rate has increased since the 1950s and 1960s, when children were not expected to live into their teenage years. In the 1950s, children diagnosed with cystic fibrosis usually did not live long enough to attend school. Presently, more than 45% of patients with cystic fibrosis are over 18 years of age. The predicted median age of survival is the mid-30s. Due to the increased survival rate, more adults present with cystic fibrosis complications. Although other organs are affected, respiratory failure accounts for about 85% of the mortalities.

### Pathophysiology

Cystic fibrosis is a genetic disease of the exocrine glands (glands that secrete hormones into ducts, also called duct glands), such as the sweat, salivary, and pancreas glands. Cystic fibrosis is caused by a defective gene, the cystic fibrosis transmembrane conductance regulator, or *CFTR*, gene that is carried by both parents (see Genetic Connections). The *CFTR* gene is linked to the production of a protein called the cystic fibrosis transmembrane conductance regulator. This protein functions as a channel to facilitate the transport of negatively charged chloride ions into and out of the cell. It also inhibits sodium transport channels, inhibiting sodium transport into the cell. Due to

the extracellular ion concentration, water moves outside of the cell by osmosis, which maintains a thin layer of mucus on the epithelial cells. The genetic mutation disrupts the transport of chloride ions, sodium ions, and water, resulting in the production of a thick mucus that builds up on the epithelial cells (Fig. 26.5).

## Genetic Connections

### Cystic Fibrosis

Cystic fibrosis is a hereditary disease caused by a recessive defective gene. More than 10 million Americans are symptomless carriers of the defective cystic fibrosis gene. Genetic testing is performed to detect carriers. Each time two carriers of the defective gene have a child, the chances are:

- 25% (1 in 4) their child will have cystic fibrosis
- 50% (1 in 2) their child will carry the defective gene and not have cystic fibrosis
- 25% (1 in 4) their child will not carry the defective gene and not have cystic fibrosis

Genetic counseling is important for couples who might be at risk of carrying the gene as well as for all couples who are planning to become pregnant.

Cystic fibrosis is a multisystem disease that produces increased amounts of thick mucus in the respiratory, gastrointestinal (GI), and reproductive systems. The disease is characterized by thick, viscous mucus that clogs the lungs and obstructs the pancreas. Other organs that are affected include the liver, salivary glands, and testes. The mucus build-up in the GI system and pancreas leads to an exocrine insufficiency, blocking the transport of pancreatic enzymes and resulting in decreased breakdown and absorption of food. The patient may also develop a pancreatic endocrine insufficiency (insufficient secretion of the hormone insulin into the bloodstream to target organs), which results in cystic fibrosis–related diabetes.

The increase in thick, sticky mucus production in the lungs leads to mucus plugging of the airways, inflammation, and **bronchiectasis** (chronic dilation of the bronchioles). Initially, the upper lobes are affected by the disease. Stasis of the mucus leads to chronic respiratory infections. The organisms that cause the infection are often *Staphylococcus aureus* and *Haemophilus influenzae* in childhood and *Pseudomonas aeruginosa* in adults. Pulmonary disease is the most challenging aspect of managing cystic fibrosis and is the leading cause of mortality.

There are often reproductive problems with males who have cystic fibrosis. The thick mucus production results in plugging and deterioration of the vas deferens before birth. The vas deferens transports sperm from the testes to join the semen. This deterioration results in sterility, but modern reproductive technology may allow these patients to reproduce.

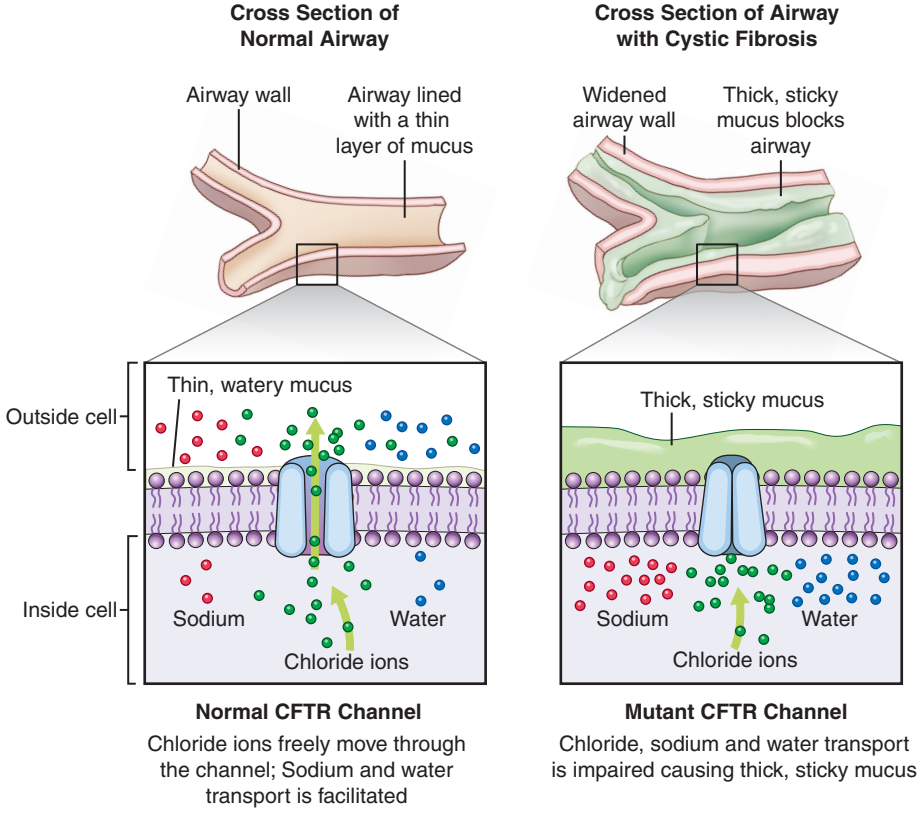



**FIGURE 26.5** A genetic mutation of the *CFTR* gene disrupts the transport of chloride and sodium ions and water in cystic fibrosis, resulting in thick mucus deposits on the epithelial cells.

## Clinical Manifestations

The clinical manifestations are related to the organ systems affected and can vary significantly among patients. Respiratory symptoms include increased work of breathing, as evidenced by tachypnea and irregular breathing patterns. The patient presents with diaphoresis, nasal flaring, pursed-lip breathing, intercostal muscle retractions, and the use of accessory muscles. Other signs include a persistent cough that produces thick sputum, wheezing, a decreased ability to exercise, repeated lung infections, and inflamed nasal passages.

The GI effects are largely due to the accumulation of mucus in the pancreas, which hinders the release of pancreatic enzymes that help with the breakdown of food. Clinical manifestations of this include:

- Foul-smelling, greasy stools
- Poor weight gain and growth
- Intestinal blockage, particularly in newborns (meconium ileus)
- Severe constipation

## Management

### *Medical Management*

#### Diagnosis

Cystic fibrosis is primarily diagnosed through laboratory testing. The *CFTR* gene mutation in the sweat glands results in increased levels of chloride noted in the sweat because of the impairment of sodium chloride reabsorption. The sweat chloride test measures the concentration of chloride in the patient's sweat. A high level of chloride is an indication of cystic fibrosis. The normal value is less than 30 mEq/L. The test is positive for cystic fibrosis when the chloride level is greater than or equal to 60 mEq/L. Cystic fibrosis screening in newborns has been mandated throughout the United States since 2010. Newborn screening allows treatment to begin before symptoms develop.

#### Medications

The patient with cystic fibrosis takes the same medications as other patients with lower airway disorders, such as bronchodilators. In addition, the patient may take mucolytics to thin the mucus. Mucomyst (a mucolytic) and inhaled hypertonic saline increase the hydration of the airway to improve mucociliary clearance. The patient also takes anti-inflammatories such as ibuprofen to diminish the inflammatory response and slow the rate of decline in lung function.

Antibiotics are used for chronic pulmonary infections. The antibiotic most often used is tobramycin; its aerosolized form allows for minimal systemic effects. Azithromycin is another antibiotic frequently used. Fat-soluble vitamins (A, D, E, and K) are given as supplements because the long-term antibiotic therapy eradicates the normal flora of the GI tract. Pancreatic replacement enzymes are given to help with digestion and absorption of food. Patients, especially children and teenagers, may also need supplemental calories to maintain their weight and improve energy levels.

The most recent addition to pharmacological management of cystic fibrosis is the use of CFTR modulators. CFTR modulators are medications targeting specific defects caused by mutations in the *CFTR* gene. These treatments do not correct errors in the *CFTR* gene but attempt to correct the malfunctioning protein made by the *CFTR* gene. There are many different mutations causing defects in the protein. The currently developed CFTR therapies are effective only in people with specific mutations.

### *Surgical Management*

Surgical management is an option for patients with cystic fibrosis. A lung or pancreas transplant or both may be considered. The transplant may extend the patient's life, but cystic fibrosis patients often have problems with other organs, which makes them a poor risk for the surgery. Also, transplantation does not cure the disease; the defective gene is still present. The patient may experience a reduction of symptoms initially but will then experience a gradual redevelopment of the disease.

### *Nursing Management*

#### Assessment and Analysis

The patient with cystic fibrosis usually presents with a variety of symptoms related to the issues with blocked ducts in the sweat and pancreatic glands and the respiratory system. They include:

- Thick, sticky mucus
- Persistent coughing
- Tachypnea
- Frequent lung infections
- Wheezing or shortness of breath
- Poor growth or slow weight gain
- **Steatorrhea** (frequent greasy, bulky, fatty stools) or difficult bowel movements
- Very salty-tasting skin

#### Nursing Diagnoses

- **Ineffective airway clearance** related to increased sputum production
- **Impaired gas exchange** related to increased sputum
- **Fatigue** related to dyspnea
- **Risk for infection** related to stasis of mucus
- **Imbalanced nutrition**: less than body requirements related to impaired digestive process and absorption of nutrients, increased work of breathing

#### Nursing Interventions

##### *Assessments*

- Oxygen saturation
  *Mucus plugging leads to decreased airflow and impaired gas exchange.*
- Temperature
  *Increased temperature is indicative of an infection.*

- Respiratory rate
  *Increased work of breathing causes an increase in the respiratory rate.*
- Breath sounds
  *Mucus plugging causes wheezing and crackles because of blockage of the airways and air trapping of the bronchioles.*
- Weight
  *Weight loss occurs because of the impaired pancreatic enzyme absorption disrupting the breakdown and absorption of food.*
- Sputum for culture and sensitivities
  *These tests identify the organism and appropriate antibiotic to ensure adequate therapy.*

### *Actions*

- Airway clearance techniques such as postural drainage and percussion
  *The airway must be clear of secretions to maintain patency.*
- Administer medications as ordered:
  - Bronchodilators
    *Bronchial smooth muscle relaxants help open the airway and ease the work of breathing.*
  - Antibiotics
    *Manage respiratory infections*
  - Mucolytics
    *Thin secretions, facilitating airway clearance*
  - CFTR modulators
    *The medications correct the function of the defective protein made by the cystic fibrosis gene (they do not correct the gene itself).*
  - Pancreatic enzymes
    *Pancreatic enzymes aid in the breakdown and absorption of food.*
  - Nutritional supplements
    *Increase caloric and vitamin intake to increase energy and increase weight*

### *Teaching*

- Airway clearance techniques, the use of supplements to meet nutritional needs, taking medications as prescribed, and being aware of and avoiding risk factors of an exacerbation
  *Most therapy for cystic fibrosis is performed on a daily basis in the home. In order to manage the disease, the patient and family need a strong understanding of the disease and effective treatment.*
- Genetic screening
  *The American College of Obstetricians and Gynecologists (ACOG) suggests all couples should be offered screening to identify if they are cystic fibrosis carriers (not just people considered "at risk" like Caucasians and individuals with a family history of cystic fibrosis) because the increasing diversity of the population makes it harder to assign a person to just one ethnicity.*
- Genetic counseling
  *Counseling should be offered to all couples who are planning to become pregnant.*

### Evaluating Care Outcomes

Well-managed patients with cystic fibrosis and their caregivers have adequate knowledge to manage the disease through airway clearance techniques and reduced exposure to risk factors for pulmonary infections; they are active participants in the plan of care. The patient presents with a well-controlled respiratory status and free from infection. The patient maintains adequate nutritional status by utilizing pancreatic enzymes, adequate diet, and nutritional supplements. The patient and/or the caregivers can identify changes that suggest an exacerbation of the condition in order to intervene as quickly as possible. These patients and their families use community resources that are available for information and support.

### Connection Check 26.3

What is the priority treatment for a patient with cystic fibrosis?

A. Nutritional counseling
B. Airway clearance
C. Medication administration
D. Patient education

## LUNG CANCER

### Epidemiology

American Cancer Society (ACS) statistics for 2018 indicate that lung cancer remains the second most common cancer in both men and women. It is also the number one cancer killer in the United States for both men and women (about 154,050 deaths; 83,550 in men and 70,500 in women). The ACS estimated approximately 234,030 new cases of lung cancer for 2018.

Black men have a higher incidence of lung cancer than white men, whereas white women have a higher incidence than black women. Women have an overall lower incidence than men. Survival rates vary based the stage of disease at diagnosis. If diagnosed with stage 1A lung cancer, the survival rate is 49%; if diagnosed with stage IV lung cancer, the survival rate is 1%. When diagnosed with stage IV lung cancer, the disease has already spread to lymph nodes and other organs.

Lung cancer is most prevalent in persons over age 65. The major cause (90%) of lung cancer (and the most preventable) is smoking. The risk of developing lung cancer increases as the number of cigarettes smoked and the length of time spent smoking increase. Other risk factors include "second-hand" smoke, radon, occupational pollutants, and asbestos.

### Pathophysiology

The uncontrolled growth of abnormal cells in the lungs causes lung cancer. There are two major types of lung cancer: non–small cell and small cell. Non–small-cell cancer represents 85% of lung cancers and consists of three different

types of cells. They are squamous-cell carcinoma, adenocarcinoma, and large-cell carcinoma. The 5-year survival rate for those diagnosed with non–small-cell cancer if diagnosed in the early stages is good.

Small-cell cancer, also called oat-cell cancer, represents 15% of lung cancers. It grows quickly and metastasizes to other organs in the body. Independent of the stage at diagnosis, survival statistics are poor. Only 5% to 10% of those developing small-cell cancers survive for 5 years.

## Clinical Manifestations

The symptoms of lung cancer are not typically evident early in the disease but become apparent as the disease advances. Symptoms include a new cough that does not go away or changes in a chronic cough, hemoptysis, shortness of breath, wheezing, hoarseness, and chest pain. Headache and bone pain may also be present. Weight loss is common. As the disease progresses, the symptoms worsen.

## Management

### *Medical Management*

#### Diagnosis

Diagnosis is made through several methods:

- Chest x-ray
- Computed tomography (CT) scan of the chest
- Sputum for cytology
- Bronchoscopy
- Positron emission tomography (PET) scans
- Bone scans and abdominal scans
- Mediastinoscopy

A chest x-ray or a CT scan of the chest may identify a pulmonary lesion. A cytology test on sputum may identify specific tumor cells. Bronchoscopy or mediastinoscopy allows direct visualization of the tissues to aid in the diagnosis of lung cancer. Bronchoscopy is the assessment of the larger airways, the trachea and bronchi, through a scope inserted through the mouth or nose. Mediastinoscopy is a surgical procedure that allows for direct visualization of the mediastinum. A scope is inserted through an incision in the chest that allows direct examination and collection of samples for biopsy. Bone scans and abdominal scans are performed to look for metastatic lesions. The PET scan is used to identify changes in the body's metabolism and function rather than structure. A PET scan can detect areas of increased metabolic activity as occurs with rapidly dividing cancer cells.

#### Nonsurgical Management

The treatment for lung cancer is interprofessional and is dependent on the type, size, location, and stage of the tumor. The components of nonsurgical treatment typically consist of a combination of radiation and chemotherapy. Pain management is also an important focus in treatment.

The chemotherapeutic agent used to treat lung cancer is dependent on the type and/or size of the tumor. It may be used in conjunction with surgery (discussed in the following section), or it may be the primary treatment option for more advanced cancers or if the patient is too ill for surgery.

Radiation therapy used in lung cancer treatment has great versatility. In situations where surgery is not an option, radiation can be used. Radiation can also be used palliatively to relieve symptoms or for pain control.

Pain control is a major component in lung cancer management. A pain relief ladder developed by the World Health Organization is helpful as a guideline for pain control (see Chapter 11, Fig. 11.7). Step 1 involves the use of nonopioid analgesics (acetaminophen or NSAIDs) for mild to moderate pain. Step 2 consists of a moderately potent opioid (codeine, hydrocodone, and oxycodone) plus a nonopioid for persistent pain or pain not controlled by Step 1. Step 3 includes the use of stronger opioids (morphine, fentanyl) plus a nonopioid for uncontrolled or severe pain. The use of adjuvant or additional medications is important to consider at all levels of treatment to relieve patient anxiety. Pain medication needs to be administered around the clock rather than on demand to avoid peaks of pain.

Palliative care services are appropriate to consider with the diagnosis of a life-threatening illness like lung cancer. Palliative care improves the quality of life of patients and their families. In addition to providing pain relief, palliative care can also help in the management of other distressing and debilitating symptoms, such as shortness of breath, nausea, and vomiting.

### *Surgical Management*

Surgery is the preferred treatment if there is no metastasis. Surgery is primarily used for non–small-cell tumors. There are several types of pulmonary surgery depending on the tumor site and size (Fig. 26.6):

- Lobectomy is the removal of an entire lobe of the lung.
- Pneumonectomy is the removal of the entire lung.
- Wedge resection is the removal of a small section of a lobe of the lung.

Chemotherapy may be administered prior to surgery to reduce the size of the tumor to aid in resection. The administration of a chemotherapeutic agent in an effort to shrink the tumor prior to surgery is a type of **neoadjuvant therapy**. Additionally, chemotherapy can be used as **adjuvant therapy** after surgery to kill any remaining cancer cells. Similar to chemotherapy, radiation is also used to shrink the tumor prior to surgery or after surgery to kill any remaining cancer cells.

### Connection Check 26.4

When should palliative care be initiated for patients diagnosed with lung cancer?

A. Upon diagnosis
B. After chemotherapy
C. After surgery
D. Upon patient request

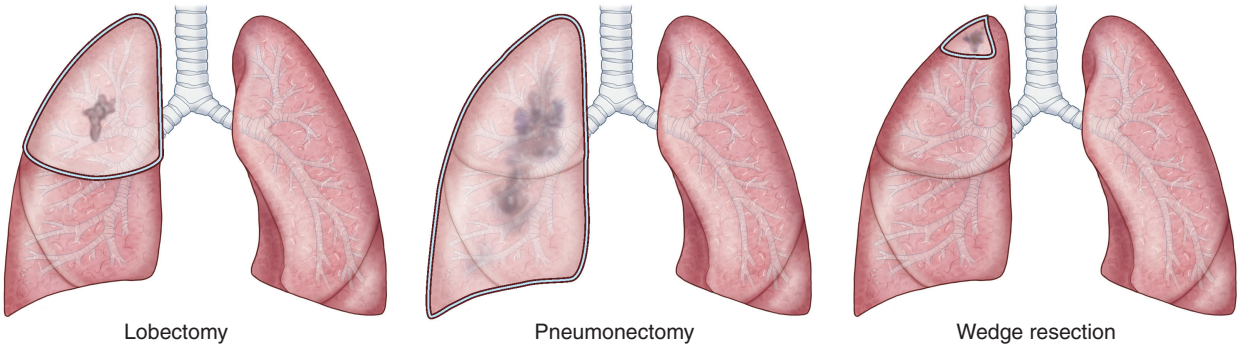



**FIGURE 26.6** Types of surgeries for lung cancer: lobectomy to remove cancer cells localized in one lobe, a wedge resection for cancer localized in one small area of the lung, and a pneumonectomy for cancer cells spread diffusely in the lung.

## *Nursing Management*

### Assessment and Analysis

The patient with lung cancer presents with the following characteristics as a result of abnormal cell growth and tumors in the lungs causing impaired chest movement and air exchange; they usually occur in the late stages of the disease:

- Persistent cough
- Dyspnea
- Wheezing
- Hemoptysis
- Chest pain
- Frequent episodes of pneumonia or bronchitis

### Nursing Diagnoses

- **Ineffective gas exchange** related to disruption of pulmonary cells secondary to lung cancer
- **Anxiety** related to the inability to breathe effectively
- **Activity intolerance** related to fatigue and dyspnea

### Nursing Interventions

#### *Assessments*

- Oxygen saturation
  *Decreased $SpO_2$ is due to poor gas exchange. An $SpO_2$ of less than 90% indicates significant oxygenation problems.*
- Temperature
  *Increased temperature is a sign of infection.*
- Breath sounds
  *The presence of wheezes may indicate airway obstruction. Rhonchi indicate increased secretions in the upper airways.*
- Cough
  *Cough indicates an irritation of the tracheobronchial tree. The presence of hemoptysis indicates the rupture of small blood vessels.*
- Pain
  *Pain increases respiratory rate; anxiety decreases quality of life.*
- Appetite/weight
  *Appetite may be decreased because of the side effects of chemotherapy or loss of energy due to increased work of breathing. Monitoring the weight helps to identify nutritional deficiencies.*
- Focused postoperative assessment:
  - Vital signs
    *Hypotension and/or tachycardia may indicate excessive blood or fluid loss.*
  - Breath sounds
    *Diminished or absent breath sounds may indicate postoperative atelectasis.*
  - Suture line
    *A suture line that is reddened, warm to touch, and/or draining thick, yellow drainage indicates infection.*
  - Chest tube
    - Monitor amount and color of chest tube drainage.
      *Excessive bloody drainage may indicate a bleed within the chest. Cloudy drainage may indicate infection.*
    - Monitor water-seal chamber.
      *Persistent bubbling in the water-seal chamber indicates an air leak in the chest tube system.*

  *See Chapter 27 for a detailed description of chest tube care.*

#### *Actions*

- Provide oxygen.
  *Increase the $SpO_2$ to 90%.*
- Administer medications as ordered.
  - Pain medications/Anti-anxiety medications
    *Pain and anti-anxiety medications provide relief from both pain and anxiety, allowing better relaxation, increased expansion of the lungs to improve oxygenation, and improved quality of life.*
  - Bronchodilators
    *Bronchodilators, bronchial smooth muscle relaxants, open the airway and decrease the work of breathing.*
- Provide small, frequent meals with dietary supplements.
  *Small, frequent meals avoid excessive pressure on the diaphragm associated with a large meal. Dietary supplements increase nutritional caloric intake, providing energy for the work of breathing.*
- Position—semi-Fowler's
  *The semi-Fowler's position increases oxygenation by allowing full lung expansion.*

- Focused postoperative actions
  - Maintain a closed chest tube system.
    *A closed system prevents any inadvertent air leaks.*
  - Never clamp the chest tube.
    *Clamping the chest tube may result in increased air or fluid in the pleural space, worsening the pneumothorax, and may lead to a tension pneumothorax.*

  *See Chapter 27 for a detailed description of chest tube care.*

### Teaching

- Breathing techniques
  *Controlled breathing techniques help to increase the clearance of sputum and reduce the sense of breathlessness. Pursed-lip breathing encourages the exchange of oxygen and carbon dioxide.*
- Pacing activities
  *Pacing conserves energy and decreases the work of breathing.*
- Smoking cessation program
  *Smoking cessation can change the course of the disease process.*
- Nutritional needs
  *Small, frequent meals decrease the work of breathing with less impact on the diaphragm.*
- Medication regimen
  *Knowledge regarding medications and their use, such as proper use of inhalers, increases the ability to manage the disease.*
- Use of pain medications around the clock
  *Improves patient comfort and quality of life by maintaining a level of pain control rather than suffering peaks of discomfort*

### Evaluating Care Outcomes

A well-managed patient with lung cancer has the pain under control, sufficient appetite and weight, and adequate oxygenation. Positive outcomes are achieved through around-the-clock pain medication; small, frequent meals; and appropriate use of oxygen and bronchodilators. Regular provider follow-up and palliative care referrals are essential to maintaining an optimal quality of life.

### Connection Check 26.5

The nursing plan of care for a patient diagnosed with lung cancer includes which of the following? *(Select all that apply.)*

A. Education about disease management
B. Frequent assessment of pain levels
C. Reminders that recovery is coming soon
D. Frequent assessment of oxygenation
E. Weaning from oxygen because the disease is terminal

## Making Connections

### CASE STUDY: WRAP-UP

Clifford continues to be short of breath and to wheeze. His $SpO_2$ remains acceptable while he receives oxygen via the nasal cannula. After the first three nebulizer treatments, his peak flow reading is repeated. It is slightly improved but not back to baseline. Clifford then receives Prednisone 60 mg intramuscularly (IM). The symptoms slowly begin to subside. A repeat of the peak flow reading reveals continued improvement. When Clifford's symptoms are fully resolved, he is discharged from the emergency department with a prescription for an oral prednisone taper. Before he leaves, hospital personnel ensure that he has an appointment with his primary care provider to review this hospital visit and update his asthma action plan.

### Case Study Questions

1. What is the most important component of the medical management of Mr. Davis?
   A. Breathing techniques
   B. Disease management through education
   C. Use of "rescue" medications
   D. Use of a peak flow meter
2. If there are no wheezes and diminished breath sounds upon reassessment, what conclusion can the nurse make?
   A. Mr. Davis has resolved his respiratory condition.
   B. Mr. Davis has responded to the bronchodilator therapy.
   C. Mr. Davis has a partially obstructed airway.
   D. Mr. Davis needs another nebulizer treatment.
3. What does the nurse recognize as the priority for Mr. Davis when a partially obstructed airway is suspected?
   A. Airway management
   B. Medication administration
   C. IV line insertion
   D. Patient education
4. What is a major component of the treatment program for Mr. Davis?
   A. A smoking cessation program
   B. A physical exercise program
   C. Genetic counseling
   D. Dietary counseling

5. Which statement about Mr. Davis's medications indicates the need for further teaching?
   A. "I use my albuterol (Proventil) when I am having difficulty breathing."
   B. "I wait 5 minutes between my inhalation puffs."
   C. "I will be able to discontinue all of my medications when my asthma is under control."
   D. "I should not suddenly stop taking the prednisone."

## CHAPTER SUMMARY

Asthma is a chronic lung disease characterized by intermittent, reversible airway obstruction resulting from inflammation of the lung's airways and a tightening of the muscles that surround the airways. The patient with asthma presents with the symptoms of increased sputum, increased respirations, and wheezes. Effective treatment of asthma involves assessment and control of environmental triggers, monitoring of symptoms, pharmacological treatment, and education. Pharmacological management typically falls into two categories: long-term control medications and "rescue" medications. Long-term control medications are used daily to maintain control of the asthma. "Rescue" medications are those medications used once an asthma attack has started.

Chronic obstructive pulmonary disease is composed of two pulmonary diseases: emphysema and chronic bronchitis. Both diseases cause obstruction to the airflow but in different ways. The patient with emphysema has airway obstruction due to overdistention and air trapping of the alveoli. Chronic bronchitis results when there is inflammation of the bronchi and bronchioles. The inflammation causes an increase in the production of thick mucus. The walls of the bronchus thicken and cause airway obstruction. The management plan for COPD has four goals: monitor the disease, reduce exposure to risk factors, manage stable COPD, and manage exacerbations. The major components of pharmacological management are bronchodilators: beta$_2$-adrenergic agonists and anticholinergics used individually or in combination on an as-needed or regular basis to control symptoms.

The major diagnostic test for both asthma and COPD as well as other lower airway disorders is the pulmonary function test ($FEV_1$), which measures the amount of air that is moved in and out of the tracheobronchial tree. The $FEV_1$ is the amount of air forcefully exhaled within 1 second after a forced inhalation.

Cystic fibrosis is a genetic disease of the exocrine glands, such as the sweat, salivary, or pancreas glands. It is a multisystem disease that produces increased amounts of thick mucus in the respiratory, GI, and reproductive systems. The increase in thick, sticky mucus production leads to mucus plugging of the airways. It also blocks the pancreatic enzymes from breaking down and absorbing food. Medication management includes bronchodilators, mucolytics to thin the mucus, anti-inflammatories to diminish the inflammatory response, CFTR modulators, and antibiotics in the case of infection. Patients also require pancreatic replacement enzymes to help with digestion and absorption of food as well as supplemental calories to maintain weight.

Lung cancer is caused by the uncontrolled growth of abnormal cells in the lungs. There are two major types of lung cancer: non–small cell and small cell. The survival rate for those diagnosed with non–small-cell cancer is good at 5 years. Small-cell cancer grows quickly and metastasizes to other organs in the body. Only 5% to 10% of those developing small-cell cancers survive for 5 years. Treatment is multidisciplinary and is dependent on the type, size, location, and stage of the tumor. Medical management of lung cancer typically consists of a combination of surgery, radiation, chemotherapy, and pain management. Palliative care services are appropriate to consider from diagnosis through the course of the illness because they can improve the quality of life of patients and their families.




To explore learning resources for this chapter, go to **Davis Advantage** and find:
- Answers to in-text questions
- Chapter Resources and Activities
- NCLEX®-Style Chapter Review Questions
- Bibliography

# Davis Advantage for Medical-Surgical Nursing Topics

## TRADITIONAL VIEW

### The Surgical Experience
Pain Management
Preoperative Care
Intraoperative Care
Postoperative Care

### Immune and Infectious Disorders
Hypersensitivity — **NEW!**
MRSA
Lupus
HIV and AIDS — **NEW!**

### Oxygenation Disorders
Influenza
Tuberculosis
Asthma
Pulmonary Embolism
Acute Respiratory Distress Syndrome
Obstructive Sleep Apnea — **NEW!**
COPD — **NEW!**

### Perfusion and Conduction Disorders
Conduction Disorders and Other MI Complications
Left and Right Heart Failure
Hyperlipidemia and Hypertension
Deep Venous Thrombosis
Cardiac Function and Assessment — **NEW!**
The Electrical Conduction System — **NEW!**

### Hematologic Disorders
Anemia
Leukemia
Sickle Cell Disease
Cancer

### Neurological Disorders
Brain Tumor
Seizures
Stroke
Guillain-Barré Syndrome
Multiple Sclerosis
Alzheimer's Disease

### Endocrine Disorders
Diabetes Insipidus
Adrenal Disorders
Diabetes
Endocrine Function — **NEW!**
Thyroid and Parathyroid Disorders — **NEW!**

### Sensory System Disorders
Glaucoma
Hearing Loss
Cataracts

### Integumentary and Musculoskeletal Disorders
Pressure Injury
Burns
Osteoporosis
Musculoskeletal Trauma and Complications

### Gastrointestinal Disorders
Gastroesophageal Reflux
Pancreatitis
Irritable Bowel Syndrome
Cirrhosis
Appendicitis
Peptic Ulcer Disease — **NEW!**

### Fluid, Electrolyte, and Acid-Base Homeostasis
Fluid and Fluid Imbalances
Acid-Base Balance
Electrolyte Balance

### Renal Disorders
Renal Failure
Kidney Stones
Bladder Incontinence

### Breast and Reproductive Disorders
Endometriosis
Benign Prostatic Hyperplasia — **NEW!**
Sexually Transmitted Infections
Breast Cancer

### Special Populations
Shock
Poisoning
Obesity
Opioids — **NEW!**

# Davis Advantage for Medical-Surgical Nursing Topics

## CONCEPT VIEW

**Bowel Elimination**
Irritable Bowel Syndrome

**Cellular Regulation**
Cancer
Brain Tumor
Breast Cancer

**Clotting**
Pulmonary Embolism
Deep Venous Thrombosis

**Comfort**
Pain Management
Opioids — **NEW!**

**Digestion**
Gastroesophageal Reflux
Cirrhosis
Peptic Ulcer Disease — **NEW!**

**Fluid and Electrolyte Balance**
Diabetes Insipidus
Osteoporosis
Fluid and Fluid Imbalances
Electrolyte Balance

**Female Reproduction**
Endometriosis

**Hematological Regulation**
Anemia
Leukemia
Sickle Cell Disease

**Immunity**
Hypersensitivity — **NEW!**
Guillain-Barré Syndrome
HIV and AIDS — **NEW!**

**Infection**
Influenza
Appendicitis
MRSA

**Inflammation**
Lupus
Pancreatitis

**Male Reproduction**
Benign Prostatic Hyperplasia — **NEW!**

**Metabolism**
Adrenal Disorders
Diabetes
Endocrine Function — **NEW!**
Thyroid and Parathyroid Disorders — **NEW!**

**Mobility**
Multiple Sclerosis
Musculoskeletal Trauma and Complications

**Neurologic Regulation**
Seizures
Stroke
Alzheimer's Disease

**Nutrition**
Obesity

**Oxygenation**
Acute Respiratory Distress Syndrome
Asthma
Tuberculosis
Obstructive Sleep Apnea — **NEW!**
COPD — **NEW!**

**Perfusion**
Conduction Disorders and Other MI Complications
Left and Right Heart Failure
Hyperlipidemia and Hypertension
Cardiac Function and Assessment — **NEW!**
The Electrical Conduction System — **NEW!**

**Perioperative Care**
Preoperative Care
Intraoperative Care
Postoperative Care

**pH Regulation**
Acid-Base Balance

**Sensory Perception**
Cataracts
Glaucoma
Hearing Loss

**Sexuality**
Sexually
Transmitted Infections

**Skin Integrity**
Burns
Pressure Injury

**Trauma**
Shock
Poisoning

**Urinary Elimination**
Bladder Incontinence
Kidney Stones
Renal Failure

## PERSONALIZED TEACHING PLAN

## Topic: COPD

### *In a Flash: Terminology Associated with COPD*

*Directions*

Divide students into groups of two to four. Instruct the groups to make flash cards for the following terms associated with chronic obstructive pulmonary disease (COPD):

- Barrel chest: An AP diameter (anteroposterior diameter as compared to the transverse diameter) of 2:2 rather than the normal diameter of 1:2.
- Blue Bloater: Clients with chronic bronchitis are typically obese, have hypoxemia and thus, appear cyanotic, giving them this nickname.
- Chronic bronchitis: Disease that affects the small airways and is defined as the presence of cough and sputum production for at least 3 months in each of 2 consecutive years.
- Cor pulmonale: right-sided heart failure from chronic pulmonary hypertension and right ventricular enlargement.
- Emphysema: A disease caused by destruction of the alveoli.
- Exacerbation: An acute onset of symptoms from a chronic illness.
- Forced vital capacity 1 ($FVC_1$): The maximum volume of air exhaled during a forced expiration in the first second.
- Forced vital capacity (FVC): The maximum volume of air exhaled during a forced expiration.
- Hyperinflation of the alveoli: Occurs with emphysema when the lungs lose elasticity.
- Hypoxemic: Low $SpO_2$ and $PaO_2$.
- Pink Puffer: Nickname for a client with emphysema because of their reddish complexion and puffing breathing pattern.
- Secondary spontaneous pneumothorax: Pneumothorax that occurs in patients with underlying lung disease.
- Tripod positioning: An upright sitting position to help ease the work of breathing.

Once the groups have completed their flash cards, the students should quiz each other.

*Tips*

Developing a systematic plan to learn and apply terminology will help students be able to share the learning experience by using different methods of learning: visual, auditory, and psychomotor. Discussion will enhance auditory learning, and the documentation of findings will enhance both visual and psychomotor learning behaviors.

*Goals*

© 2020. *Davis Advantage for Medical-Surgical Nursing,* F.A. Davis Company.

Flash cards are an excellent way to learn basic terminology. This activity helps students create a useful study aid for COPD.

### *Tell a Tale: Client with an Adrenal COPD*

*Directions*

Ask students to work in pairs. Building on the knowledge gained from the flash card activity, instruct students to create a client scenario that incorporates at least 10 of the below terms into their scenario correctly:

- Barrel chest
- Blue bloater
- Chronic bronchitis
- Cor pulmonale
- Emphysema
- Exacerbation
- Forced vital capacity (FVC)
- Forced vital capacity (FVC)
- Hyperinflation of the alveoli
- Hypoxemic
- Pink puffer
- Secondary spontaneous pneumothorax
- Tripod positioning

Once they have created their scenario, students should meet in small groups to share their scenarios and provide feedback to each other.

*Tips*
Students should be encouraged to mention assessment findings, diagnostic testing, and medications used in order to incorporate 10 terms into a scenario.

*Goals*

Building from the flash card activity, this exercise forces students to think critically about COPD and how their various components interact

### *Compare and Contrast: Emphysema and Chronic Bronchitis*

*Directions*

Divide students into pairs. Ask each pair of students to create a table of characteristics associated with emphysema and chronic bronchitis. Each table should include a section for characteristics related to:

- risk factors
- signs and symptoms
- diagnostic testing
- treatment

© 2020. *Davis Advantage for Medical-Surgical Nursing,* F.A. Davis Company.

*Tips*

Providing a visual depiction of facts helps students to identify concepts that are necessary for the care and management of clients who have these identified disease processes. An example table is provided below.

| Characteristics | Emphysema | Chronic Bronchitis |
|---|---|---|
| Risk Factors | Smoking history; occupational or environmental exposure; alpha-1 antitrypsin deficiency; exposure to secondhand smoke | Smoking history; occupational or environmental exposure; exposure to secondhand smoke |
| Signs and Symptoms | Progressive dyspnea with exertion; sputum often present; air trapping | Progressive; sputum production for at least 3 months for 2 consecutive years; thick tenacious mucus |
| Diagnostic Testing | Pulmonary function test (spirometry); forced vital capacity; pulse oximetry; ABG | Pulmonary function test (spirometry); forced vital capacity; pulse oximetry; ABG |
| Treatment | Bronchodilators; $beta_2$-adrenalgic agonists; anticholinergics; glucocorticoids; antibiotics; oxygen; positioning; breathing techniques; activity pacing; smoking cessation | Bronchodilators; $beta_2$-adrenalgic agonists; anticholinergics; glucocorticoids; antibiotics; oxygen; positioning; breathing techniques; activity pacing; smoking cessation |

*Goals*

Students must understand the difference between emphysema and chronic bronchitis. This activity can serve as a quick reference for understanding the two disorders.

## RELATED QUIZZING ASSIGNMENTS

To help students explore the full depth of this topic, the following are available to assign:

- Pre-set Edge assignment (10-15 questions): Lower Airway Disorders: COPD
- Quick or custom assignment from the full topic question bank: Lower Airway Disorders

## ADDITIONAL RESOURCES

© 2020. *Davis Advantage for Medical-Surgical Nursing*, F.A. Davis Company.

PowerPoint slides for Chapter 26: *Coordinating Care for Patients with Lower Airway Disorders*
Image Bank for Chapter 26: *Coordinating Care for Patients with Lower Airway Disorders*
Test Bank for Chapter 26: *Coordinating Care for Patients with Lower Airway Disorders*

© 2020. *Davis Advantage for Medical-Surgical Nursing*, F.A. Davis Company.

# SAMPLE TEST BANK QUESTIONS*
# Chapter 17: Priorities for the Postoperative Patient

***DISCLAIMER: These questions are advance materials and have not yet been copyedited. They are a DRAFT version of the final questions that will be available for instructors when Davis Advantage Med-Surg, 2nd edition publishes in October 2019.***

**MULTIPLE CHOICE**

5. Which of the statements by a patient undergoing a craniotomy indicates the need for further teaching?

A. "I will probably go to the intensive care unit immediately after surgery."
B. "I will be attached to a cardiac monitor while recovering."
C. "I will be able to get some good sleep after I leave the operating room."
D. "My family will be able to visit me while I am recovering."

ANS: C
Chapter number and title: 17. Priorities for the Postoperative Patient
Chapter learning objective: 3. Developing support strategies for the surgical patient's family in the immediate postoperative period
Chapter page reference: To come
Heading: Intensive Care Unit
Integrated Processes: Teaching and Learning
Client Need: Physiologic Integrity – Physiological Adaptation
Cognitive level: Analysis (Analyzing)
Concept: Perioperative
Difficulty: Moderate

| | Feedback |
|---|---|
| **A** | This statement reflects that the patient understands teaching. Postoperative care in the ICU is indicated for critically ill patients who require extensive and complex monitoring because of the high risk of complications, and are transferred directly to the ICU immediately following the operative procedure. Examples of patients recovered in the intensive care setting include patients undergoing transplant surgery, craniotomy, and coronary artery bypass procedures, and trauma patients undergoing multiple procedures. |
| **B** | This statement reflects that the patient understands teaching. Postoperative care in the ICU is indicated for critically ill patients who require extensive and complex monitoring because of the high risk of complications, and are transferred directly to the ICU immediately following the operative procedure. |
| **C** | This statement indicates the need for additional teaching. Because the patient will be monitored closely during the postanesthesia care unit, vital signs and neurological status are monitored very frequently, particularly after a craniotomy. |
| **D** | This statement reflects understanding of teaching, as family members are able to visit the patient for short periods of time while being recovered. |

PTS: 1 CON: Perioperative

**MULTIPLE RESPONSE**

21. Prior to advancing to Phase II of postanesthesia care, the patient must achieve which outcomes? *Select all that apply.*
    A. Voiding clear urine
    B. Stable vital signs
    C. Alert and talking
    D. Oxygenation saturation 98%
    E. Stable airway

    ANS: B, D, E
    Chapter number and title: 17. Priorities for the Postoperative Patient
    Chapter learning objective: 5. Evaluating postoperative interventions on the inpatient unit.
    Chapter page reference: To come
    Heading: Post-Anesthesia Care Unit Phases of Care
    Integrated Processes: Nursing Process - Evaluation
    Client Need: Physiological Integrity – Physiological Adaptation
    Cognitive level: Application (Applying)
    Concept: Assessment
    Difficulty: Difficult

| | Feedback |
|---|---|
| **A** | This is incorrect. The patient does not have to void prior to transferring from the OR to the PACU. Voiding is usually addressed in Phase III or part of the Home Discharge process. However, not voiding does not automatically prevent the patient's transfer or discharge to home. |
| **B** | This is correct. While specific discharge criteria from OR to PACU vary by institution, it is important that the patient is awake with a stable airway, demonstrates adequate oxygen saturation, and has stable vital signs. |
| **C** | This is incorrect. The patient should be waking from anesthesia and have a stable airway, but does not have to be speaking. Often the patient is still drowsy from anesthesia in the PACU. |
| **D** | This is correct. While specific discharge criteria from OR to PACU vary by institution, it is important that the patient is awake with a stable airway, demonstrates adequate oxygen saturation, and has stable vital signs. |
| **E** | This is correct. While specific discharge criteria from OR to PACU vary by institution, it is important that the patient is awake with a stable airway, demonstrates adequate oxygen saturation, and has stable vital signs. |

PTS: 1 CON: Assessment

24. Which staffing ratios are appropriate nurse-to-patient ratios in the postanesthesia care unit (PACU)? *Select all that apply.*

A. 1:1
B. 1:2
C. 1:3
D. 1:4
E. 1:5

ANS: A, B, C
Chapter number and title: 17, Priorities for the Postoperative Patient
Chapter learning objective: 1. Discussing the significance of the postoperative period
Chapter page reference: To come
Heading: Inpatient Post-Anesthesia Care Unit
Integrated Processes: Nursing Process – Planning
Client Need: Physiological Integrity – Physiological Adaptation
Cognitive level: Comprehension (Understanding)
Concept: Safety
Difficulty: Moderate

| | Feedback |
|---|---|
| **A** | This is correct. The staffing varies according to the acuity level of the patients. The nurse-patient ratio can be 1:1 or 1:2. |
| **B** | This is correct. The staffing varies according to the acuity level of the patients. The nurse-patient ratio can be 1:1 or 1:2. |
| **C** | This is correct. The extended-stay patients, patients meeting transfer or discharge criteria but requiring extended monitoring, may be in 1:3 ratios. |
| **D** | This is incorrect. This is nurse to patient ratio is too high for the acuity of patients in the PACU. |
| **E** | This is incorrect. This is nurse to patient ratio is too high for the acuity of patients in the PACU. |

PTS: 1 CON: Safety

29. Which information does the postanesthesia care unit (PACU) nurse include in the hand-off to the nurse who will assume care on the medical-surgical unit? *Select all that apply.*

A. Fluid intake and blood loss
B. Placement of intravenous (IV) lines
C. Patient identification using one identifier
D. Information regarding the surgical procedure
E. Over-the-counter (OTC) medications taken at home

ANS: A, B, D
Chapter number and title: 17, Priorities for the Postoperative Patient
Chapter learning objective: 4. Applying the vital postoperative interventions for the patient in the immediate postoperative period
Chapter page reference: To come
Heading: Patient Care in the Post-Anesthesia Care Unit (PACU)/Nursing Management/Actions
Integrated Processes: Communication and Documentation
Client Need: Physiological Integrity – Physiological Adaptation
Cognitive level: Application [Applying]
Concept: Communication
Difficulty: Moderate

| | Feedback |
|---|---|
| **A** | This is correct. Fluid intake and blood loss is included in the hand-off communication process between the PACU and medical-surgical nurses. |
| **B** | This is correct. Information regarding the placement of IV lines is included in the hand-off communication process between the PACU and medical-surgical nurses. |
| **C** | This is incorrect. Patient identification during the hand-off process should include two patient identifiers, not one. |
| **D** | This is correct. Information regarding the surgical procedure is included in the hand-off communication process between the PACU and medical-surgical nurses. |
| **E** | This is incorrect. Important medications taken by the patient at home, not OTC medications, should be included in the hand-off process. |

PTS: 1 CON: Communication

**ORDERED RESPONSE**

30. The postanesthesia care unit (PACU) is receiving a patient from the Operating Room. What is the correct order to perform the following assessments?

1. Level of consciousness
2. Airway status
3. Skin color
4. Oxygen saturation
5. Apical pulse

ANS: 2 4 5 1 3

Chapter number and title: 17 – Priorities for the Postoperative Patient
Chapter learning objective: 2. Explaining the priority assessments for the postsurgical patient
Chapter page reference: To come
Heading: Priority Assessments
Integrated Processes: Nursing Process - Assessment
Client Need: Physiological Integrity – Physiological Adaptation
Cognitive level: Application (Applying)
Concept: Assessment
Difficulty: Difficult

| | Feedback |
|---|---|
| | While many of these assessments are completed simultaneously, according to the ABC's and other priority assessments, the following order is best.<br>Airway status to make sure the patient as a clear, stable airway. Breathing status, including breath sounds and rate are next. Circulation is assessed through apical pulses as these are central and less impacted by peripheral vasoconstriction. Neurological status is next and includes level of consciousness, motor function and sensation. Skin color and temperature is next. |

PTS: 1 CON: Assessment

# SAMPLE TEST BANK QUESTIONS*
# Chapter 26: Coordinating Care for Patients With Lower Airway Disorders

***DISCLAIMER: These questions are advance materials and have not yet been copyedited. They are a DRAFT version of the final questions that will be available for instructors when Davis Advantage Med-Surg, 2nd edition publishes in October 2019.***

**MULTIPLE CHOICE**

8. The nurse is providing care to a patient admitted after experiencing an acute asthma attack. Which assessment findings indicate the need for an immediate intervention?
   A. Retractions and fatigue
   B. Tachycardia and tachypnea
   C. Inaudible breath sounds
   D. Diffuse wheezing and the use of accessory muscles when inhaling

   ANS: C
   Chapter number and title: 26, Coordinating Care for Patients With Lower Airway Disorders
   Chapter learning objective: 2. Correlating clinical manifestations to pathophysiological processes of asthma.
   Chapter page reference: To come
   Heading: Asthma/Complications/Safety Alert
   Integrated Processes: Nursing Process – Assessment
   Client Need: Physiological Integrity – Physiological Adaptation
   Cognitive level: Analysis [Analyzing]
   Concept: Oxygenation
   Difficulty: Difficult

| | Feedback |
|---|---|
| **A** | Retractions and fatigue are also a progression of symptoms that occur with an asthma attack and represent a more severe episode. But they are not the worst or most serious set of symptoms listed, because air is still moving and exchanging. |
| **B** | During an asthma attack, tachycardia, tachypnea, and prolonged expirations are common. They are early symptoms of the disease process and can be addressed without urgency. |
| **C** | Inaudible breath sounds, reduced wheezing, and ineffective cough indicate that little or no air movement into and out of the lungs is taking place. Therefore, this set of symptoms represents the most urgent need, which is immediate intervention by the nurse to open up the lungs with drug management to prevent total respiratory failure. |
| **D** | Diffuse wheezing and the use of accessory muscles when inhaling indicate a progression of the severity of the symptoms, but airflow is still occurring; therefore, they do not require the most urgent action. |

   PTS: 1 CON: Oxygenation

11. The nurse provides education to a patient who is prescribed an aerochamber for the treatment of asthma. Which patient statement indicates the need for additional teaching?
A. "I will place the mouthpiece over my nose and mouth."
B. "I should hear a whistling sound as I inhale the medication."
C. "I should wait a few seconds before I administer the second dose."
D. "I will hold my breath for ten seconds after inhaling the medication."

ANS: B
Chapter number and title: 26, Coordinating Care for Patients With Lower Airway Disorders
Chapter learning objective: 4. Discussing the medical management of asthma.
Chapter page reference: To come
Heading: Asthma/ Box 26.2 Patient Education: Use of Metered-Dose Inhaler and Aerochamber
Integrated Processes: Teaching and Learning
Client Need: Physiological Integrity -Pharmacological and Parenteral Therapies
Cognitive level: Application (Applying)
Concept: Medication
Difficulty: Moderate

| | Feedback |
|---|---|
| **A** | This patient statement indicates a correct understanding of the information presented for proper use of an aerochamber. |
| **B** | When using the aerochamber, the patient is instructed to take a deep, slow breath in (a whistling sound indicates the patient is breathing in too quickly). This patient statement indicates the need for additional teaching. |
| **C** | This patient statement indicates a correct understanding of the information presented for proper use of an aerochamber. |
| **D** | This patient statement indicates a correct understanding of the information presented for proper use of an aerochamber. |

PTS: 1 CON: Medication

24. The nurse is caring for an older adult patient who is very thin and emaciated. The patient reports new onset of shortness of breath. A chest x-ray reveals a spot on the lungs that the physician believes is an inoperable lung cancer. Due to the patient's poor nutritional status, chemotherapy is not an option. The health-care provider also believes that the location of the cancer would make radiation therapy unsuccessful. In advocating for this patient, what approach does the nurse collaborate with the healthcare team to offer the patient?

A. Provide palliative care to keep the patient comfortable without diagnostic testing
B. Perform any procedure necessary to diagnose the patient properly
C. Promote the use of blood tests to diagnose the suspected cancer
D. Determine the patient's and family's wishes regarding diagnostic testing

ANS: D
Chapter number and title: 26, Coordinating Care for Patients With Lower Airway Disorders
Chapter learning objective: 5. Developing a comprehensive plan of nursing care for patients with lower airway disorders
Chapter page reference: To come
Heading: Lung Cancer/Nonsurgical Management
Integrated Processes: Nursing Process – Implementation
Client Need: Physiological Integrity – Basic Care and Comfort
Cognitive level: Application [Applying]
Concept: Cellular Regulation
Difficulty: Difficult

| | Feedback |
|---|---|
| **A** | An older adult emaciated patient may have few options for treatment of cancer, if confirmed. The best course of treatment may be palliative care, but it is the choice of the patient and family that should direct the plan of care and choices of diagnostic testing. |
| **B** | An older adult emaciated patient may have few options for treatment of cancer, if confirmed. The best course of treatment may be palliative care, but it is the choice of the patient and family that should direct the plan of care and choices of diagnostic testing. |
| **C** | An older adult emaciated patient may have few options for treatment of cancer, if confirmed. The best course of treatment may be palliative care, but it is the choice of the patient and family that should direct the plan of care and choices of diagnostic testing. |
| **D** | An older adult emaciated patient may have few options for treatment of cancer, if confirmed. The best course of treatment may be palliative care, but it is the choice of the patient and family that should direct the plan of care and choices of diagnostic testing. |

PTS: 1 CON: Cellular Regulation

**COMPLETION**

25. The nurse is teaching the patient recently diagnosed with asthma the correct use of the Peak Flow Meter. In which order does the nurse instruct the patient? (Enter the letter of each step in the proper sequence; use capital letters, and do not use punctuation or spaces. Example: ABCDEF).
    A. Place the mouthpiece in my mouth
    B. Ensure the slide marker is at zero (or lowest marking on the scale)
    C. Stand up straight
    D. Take a deep breath
    E. Note/record the marking on the scale
    F. Blow a "fast hard blast"

    ANS: BCDAFE
    Chapter number and title: 26 - Coordinating Care for Patients with Lower Airway Disorders
    Chapter learning objective: 3. Describing the diagnostic results used to confirm the diagnosis of lower airway disorders
    Chapter page reference: To come
    Heading: Asthma/Diagnosis
    Integrated Processes: Teaching and Learning
    Client Need: Physiological Integrity – Physiological Adaptation
    Cognitive level: Comprehension (Understanding)
    Concept: Assessment
    Difficulty: Difficult

| Feedback |
| --- |
| Correct use of the peak flow meter includes making sure the sliding marker or arrow on the peak flow meter is at the bottom of the numbered scale (zero or the lowest number on the scale), standing up straight, taking a deep breath, putting the mouthpiece of the peak flow meter into the mouth, closing the lips tightly around the mouthpiece, in one breath blowing out "fast hard blast", and noting the number on a piece of paper. |

    PTS: 1 CON: Assessment

**MULTIPLE RESPONSE**

28. The community health nurse is preparing an educational program for local residents. Which information does the nurse include about chronic obstructive pulmonary disease? *Select all that apply*.
    A. Cigarette smoking is the leading cause of COPD.
    B. Approximately 80% to 90% of deaths from COPD are related to smoking.
    C. There is an increased incidence of COPD in individuals who abuse alcohol.
    D. Less than 5% of all COPD cases are caused by deficiency in alpha-1 antitrypsin.
    E. COPD is completely reversible if the individual stops smoking.

ANS: A, B, D
Chapter number and title: 26 - Coordinating Care for Patients with Lower Airway Disorders
Chapter learning objective: 1. Describing the epidemiology of upper airway disorders
Chapter page reference: To come
Heading: COPD/Epidemiology
Integrated Processes: Teaching and Learning
Client Need: Physiological Adaptation – Reduction of Risk Potential
Cognitive level: Comprehension (Understanding)
Concept: Nursing Roles
Difficulty: Moderate

| | Feedback |
|---|---|
| **A** | This is correct. Cigarette smoking is the leading cause of COPD, and approximately 80% to 90% of deaths from COPD are related to smoking. |
| **B** | This is correct. Cigarette smoking is the leading cause of COPD, and approximately 80% to 90% of deaths from COPD are related to smoking. |
| **C** | This is incorrect. There is no association between incidence of COPD and alcohol use/abuse. |
| **D** | This is correct. Fewer than 5% of all COPD cases are caused by a deficiency of an enzyme called alpha-1 antitrypsin (AAT). AAT is produced in the liver and is present in the lungs. When present it has lung protectant properties. |
| **E** | This is incorrect. COPD causes irreversible changes in the lungs. Smoking cessation can slow the progression of the disease, but not totally reverse all lung damage. |

PTS: 1 CON: Nursing Roles

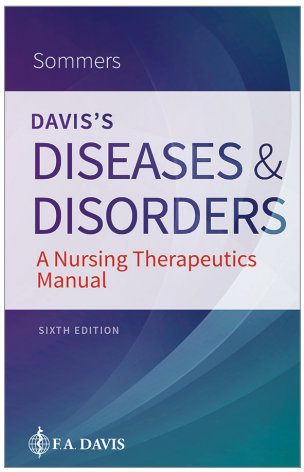
30. Which statements about lung cancer indicates that teaching was effective? *Select all that apply*.
    A. "A reclining position allows full lung expansion."
    B. "Controlled breathing reduces shortness of breath."
    C. "I will pace myself when doing things with my family."
    D. "I will eat three large meals a day to ensure I get enough calories."
    E. "Pain medication administered around the clock will improve my comfort."

ANS: B, C, E
Chapter number and title: 26, Coordinating Care for Patients With Lower Airway Disorders
Chapter learning objective: 6. Designing a teaching plan that includes pharmacological, dietary, and lifestyle considerations for patients with lower airway disorders
Chapter page reference: To come
Heading: Lung Cancer/Nursing Interventions/Teaching
Integrated Processes: Teaching and Learning
Client Need: Physiological Integrity – Physiological Adaptation
Cognitive level: Application (Applying)
Concept: Oxygenation
Difficulty: Moderate

| | Feedback |
|---|---|
| **A** | This is incorrect. This patient statement indicates a need for additional education. An upright position (e.g., semi-Fowler's) allows for full lung expansion. |
| **B** | This is correct. This patient statement indicates a correct understanding of the information presented. |
| **C** | This is correct. This patient statement indicates a correct understanding of the information presented. |
| **D** | This is incorrect. This patient statement indicates a need for additional education. Small, frequent meals decrease the work of breathing with less impact on the diaphragm. |
| **E** | This is correct. This patient statement indicates a correct understanding of the information presented. |

PTS: 1 CON: Oxygenation

# PERFECT TO BUNDLE



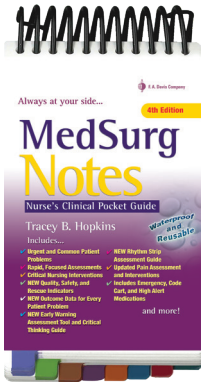

## Davis's Diseases & Disorders
### A Nursing Therapeutics Manual

The perfect Clinical Companion to *Medical-Surgical Nursing: Making Connections to Practice*

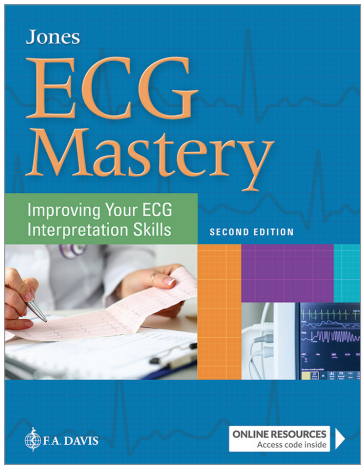
---

## MedSurg Notes

A clinical pocket guide providing on-the-spot guidance students need to care for patients with complex medical-surgical conditions.




---




## ECG Mastery
### Improving your ECG Interpretation Skills

Over 550 full-size, real-life practice strips help students develop the skills to read and interpret ECGs with confidence.