OBJECTIVES

19.1 Define key terms introduced in this chapter. Slides 14–15, 41, 54
19.2 Describe the anatomy and physiology of respiration. Slides 13–15
19.3 Differentiate between adequate and inadequate breathing based on the rate, rhythm, and quality of breathing. Slides 16–18

continued

continued

19.4 Discuss differences between the adult and pediatric airways and respiratory systems. Slide 20
19.5 Recognize signs of inadequate breathing in pediatric patients. Slide 19
19.6 Provide supplemental oxygen and assisted ventilation as needed for patients with inadequate breathing. Slides 22–23

continued
19.7 Assess the effectiveness of artificial ventilation. Slides 22–23
19.8 Discuss how to recognize and assess the patient with difficulty breathing. Slides 27–38
19.9 Discuss the care to provide for the patient with difficulty breathing. Slides 39–40

19.10 Recognize the indications, contraindications, risks, and side effects of CPAP. Slides 41–43
19.11 Use CPAP to assist the patient with difficulty breathing, as permitted by medical direction. Slides 44–47

19.12 Assist a patient with administration of a prescribed bronchodilator by inhaler or small volume nebulizer, as permitted by medical direction. Slides 83–87, 90–91
OBJECTIVES

19.13 Describe the pathophysiology, signs, and symptoms of COPD, asthma, pulmonary edema, pneumonia, spontaneous pneumothorax, pulmonary embolism, epiglottitis, cystic fibrosis, and viral respiratory infections. Slides 49–79

MULTIMEDIA

- Slide 80 Chronic Obstructive Pulmonary Diseases Video
- Slide 81 Spontaneous Pneumothorax Video
- Slide 88 Using a Metered Dose Asthma Inhaler and Spacer Video

CORE CONCEPTS

- How to identify adequate breathing
- How to identify inadequate breathing
- How to identify and treat a patient with breathing difficulty
- Use of continuous positive airway pressure (CPAP) to relieve difficulty

continued
CORE CONCEPTS

- Use of a prescribed inhaler and how to assist a patient with one
- Use of a prescribed small-volume nebulizer and how to assist a patient with one

Topics

- Respiration
- Breathing Difficulty
- Respiratory Conditions
- The Prescribed Inhaler
- The Small-Volume Nebulizer

Respiration
Inspiration

• Active process: uses muscle contraction to increase size of chest cavity
• Intercostal muscles and diaphragm contract
• Diaphragm moves down; ribs move upward and outward
• Air is pulled into lungs

Expiration

• Passive process
• Muscles and diaphragm relax
• Size of chest cavity decreases
• Air flows out of lungs
Adequate Breathing

- Breathing sufficient to support life

  **Signs**
  - No obvious distress
  - Ability to speak in full sentences
  - Normal color, mental status, and orientation

  continued

Adequate Breathing

- May be determined by observing rate, rhythm, quality
  - 12–20 breaths/minute for adult
  - 15–30 breaths/minute for child
  - 25–50 breaths/minute for infant
  - Rhythm usually regular
  - Breath sounds normally present and equal

Inadequate Breathing

- Breathing not sufficient to support life

  **Signs**
  - Rate out of normal range
  - Irregular rhythm
  - Diminished or absent lung sounds
  - Poor tidal volume

continued
Inadequate Breathing

• Signs of inadequate breathing in infants and children
  – Nasal flaring
  – Grunting
  – Seesaw breathing
  – Retractions

Pediatric Note

• Structure of an infant’s and child’s airway differs from that of an adult
  – Smaller airway easily obstructed
  – Proportionately larger tongues
  – Smaller, softer, more flexible trachea
  – Less developed, less rigid cricoid cartilage
  – Heavy dependence on diaphragm for respiration

Patient Care: Inadequate Breathing

• Assisted ventilation with supplemental oxygen
  – Pocket face mask with supplemental oxygen
  – Two-rescuer/one rescuer BVM with supplemental oxygen
  – Flow-restricted, oxygen-powered ventilation device
Artificial Ventilation
• Can be adequate or inadequate
• Chest rise and fall should be visible with each breath
• Adequate artificial ventilation rates
  – 12 breaths per minute for adults
  – 20 breaths per minute for infants and children

Artificial Ventilation
• Increasing pulse rates can indicate inadequate artificial ventilation in adults
• Decreasing pulse rates can indicate inadequate artificial ventilation in pediatric patients

Think About It
• How might you recognize the progression from adequate breathing to inadequate breathing in the assessment of your patient?
• How might your patient change during this transition?
Breathing Difficulty

- Patient's subjective perception
- Feeling of labored, or difficult, breathing
- Amount of distress felt may or may not reflect actual severity of condition
OPQRST

• Onset—When did it begin?
• Provocation—What were you doing when this came on?
• Quality—Do you have a cough? Are you bringing anything up with it?

• Radiation—Do you have pain or discomfort anywhere else in your body?
• Severity—On a scale of 1 to 10, how bad is your breathing trouble?
• Time—How long have you had this feeling?

Assessment: Observation

• Altered mental status
• Unusual anatomy
  – Barrel chest
• Patient’s position
  – Tripod position
  – Sitting with feet dangling, leaning forward
Assessment: Observation

- Work of breathing
  - Retractions
  - Use of accessory muscles
  - Flared nostrils
  - Pursed lips
  - Number of words patient can say without stopping

Assessment: Observation

- Pale, cyanotic, or flushed skin
- Pedal edema
- Sacral edema
- Coughing
Assessment: Observation

- Noisy breathing
  - Audible wheezing (heard without stethoscope)
  - Gurgling
  - Snoring
  - Crowing
  - Stridor

Assessment: Auscultation

- Lung sounds on both sides during inspiration and expiration

Assessment: Auscultation

- Wheezes—high-pitched sounds created by air moving through narrowed air passages
- Crackles—fine crackling caused by fluid in alveoli or by opening of closed alveoli

continued
Assessment: Auscultation

- Rhonchi—low sounds resembling snoring or rattling, caused by secretions in larger airways
- Stridor—high-pitched, upper-airway sounds indicating partial obstruction of trachea or larynx

Assessment: Vital Sign Changes

- Increased or decreased pulse rate
- Changes in breathing rate
- Changes in breathing rhythm
- Hypertension or hypotension
- Oxygen saturation

Patient Care

- Assure adequate ventilations
- If breathing is inadequate, begin artificial ventilation
- If breathing is adequate, non-rebreather mask at 15 Lpm
Patient Care

- Place patient in position of comfort
- Administer prescribed inhaler
- Administer continuous positive airway pressure (CPAP)

Patient Care: CPAP

- Simple principles
  - Blowing oxygen or air continuously at low pressure into airway
  - Prevents alveoli from collapsing at end of exhalation
  - Can prevent fluid shifting into alveoli from surrounding capillaries

- Common uses
  - Pulmonary edema
  - Drowning
  - Asthma and COPD
  - Respiratory failure in general
Patient Care: CPAP

• Contraindications
  – Severely altered mental status
  – Lack of normal, spontaneous respiratory rate
  – Hypotension/shock
  – Nausea and vomiting
  – Penetrating chest trauma
  – Upper GI bleeding
  – Conditions preventing good mask seal

Patient Care: CPAP

• Side effects
  – Hypotension
  – Pneumothorax
  – Increased risk of aspiration
  – Drying of corneas

Patient Care: Using CPAP

• Explain procedure to patient
• Start with low level CPAP
Patient Care: Using CPAP

- Reassess mental status, vital signs, and dyspnea level frequently
- Raise CPAP level if no relief within a few minutes

Patient Care: Using CPAP

- If patient deteriorates, remove CPAP and ventilate with bag-mask

Respiratory Conditions
Chronic Obstructive Pulmonary Disease

- Broad classification of chronic lung diseases
- Includes emphysema, chronic bronchitis, and black lung
- Overwhelming majority of cases are caused by cigarette smoking

COPD: Chronic Bronchitis

- Bronchiole lining inflamed
- Excess mucus produced
- Cells in bronchioles that normally clear away mucus accumulations are unable to do so
COPD: Emphysema

- Alveoli walls break down—surface area for respiratory exchange is greatly reduced
- Lungs lose elasticity
- Results in air being trapped in lungs, reducing effectiveness of normal breathing

Asthma

- Chronic disease with episodic exacerbations
- During attack, small bronchioles narrow (bronchoconstriction); mucus is overproduced
- Results in small airway passages practically closing down, severely restricting air flow
Asthma

- Air flow mainly restricted in one direction
- Inhalation—expanding lungs exert outward pull, increasing diameter of airway and allowing air flow into lungs
- Exhalation—opposite occurs and air becomes trapped in lungs

Pulmonary Edema

- Abnormal accumulation of fluid in alveoli
- Congestive heart failure (CHF) patients may experience difficulty breathing because of this
Pulmonary Edema

• Pressure builds up in pulmonary capillaries
• Fluid crosses the thin barrier and accumulates in and around alveoli
• Fluid occupying lower airways makes it difficult for oxygen to reach blood
• Patient experiences dyspnea

Pulmonary Edema

• Common signs and symptoms
  – Dyspnea
  – Anxiety
  – Pale and sweaty skin
  – Tachycardia
  – Hypertension
  – Low oxygen saturation

Pulmonary Edema

• Common signs and symptoms
  – In severe cases, crackles or sometimes wheezes may be audible
  – Patients may cough up frothy sputum, usually white, but sometimes pink-tinged
Pulmonary Edema

- Treatment
  - Assess for and treat inadequate breathing
  - High-concentration oxygen
  - If possible, keep patient's legs in dependent position
  - CPAP

Think About It

- Might it be possible for a patient to have multiple respiratory disorders?
- Could a person with an underlying diagnosis of COPD also have pulmonary edema?

Pneumonia

- Infection of one or both lungs caused by bacteria, viruses, or fungi
- Results from inhalation of certain microbes
- Microbes grow in lungs and cause inflammation
Pneumonia

• Signs and symptoms
  – Shortness of breath with or without exertion
  – Coughing
  – Fever and severe chills
  – Chest pain (often sharp and pleuritic)
  – Headache
  – Pale, sweaty skin
  – Fatigue
  – Confusion

• Treatment
  – Care mostly supportive
  – Assess for and treat inadequate breathing
  – Oxygenate
  – Transport

Spontaneous Pneumothorax

• Lung collapses without injury or other obvious cause
• Tall, thin people, and smokers are at higher risk for this condition
Spontaneous Pneumothorax

• Signs and symptoms
  – Sharp, pleuritic chest pain
  – Decreased or absent lung sounds on side with injured lung
  – Shortness of breath/dyspnea on exertion
  – Low oxygen saturation, cyanosis
  – Tachycardia

• Treatment
  – Transport for definitive care, as patients frequently require chest tube
  – Administer oxygen
  – CPAP contraindicated

Pulmonary Embolism

• Blockage in blood supply to lungs
• Commonly caused by deep vein thrombosis (DVT)
• Increased risk from limb immobility, local trauma, abnormally fast blood clotting
Pulmonary Embolism

- Signs and symptoms
  - Chest pain
  - Shortness of breath
  - Low oxygen saturation/cyanosis
  - Tachycardia
  - Wheezing

Pulmonary Embolism

- Treatment
  - Difficult to differentiate in field
  - Transport to definitive care
  - Oxygenate

Epiglottitis

- Infection causing swelling around glottic opening
- In severe cases, swelling can cause airway obstruction
Epiglottitis

• Signs and symptoms
  – Sore throat, drooling, difficult swallowing  
  – Preferred upright or tripod position  
  – Sick appearance  
  – Muffled voice  
  – Fever  
  – Stridor

Epiglottitis

• Treatment  
  – Keep patient calm and comfortable  
  – Do not inspect throat  
  – Administer high-concentration oxygen if possible without alarming patient  
  – Transport

Cystic Fibrosis

• Genetic disease typically appearing in childhood  
• Causes thick, sticky mucus accumulating in the lungs and digestive system  
• Mucus can cause life-threatening lung infections and serious digestion problems
Cystic Fibrosis

- Signs and symptoms
  - Coughing with large amounts of mucus
  - Fatigue
  - Frequent occurrences of pneumonia
  - Abdominal pain and distention
  - Coughing up blood
  - Nausea
  - Weight loss

Cystic Fibrosis

- Treatment
  - Caregiver often best resource for baseline assessment of patient
  - Caregivers can often guide treatment
  - Assess for, and treat, inadequate breathing
  - Transport

Viral Respiratory Infections

- Infection of respiratory tract
- Usually minor but can be serious, especially in patients with underlying respiratory diseases like COPD
Viral Respiratory Infections

• Often starts with sore or scratchy throat with sneezing, runny nose, and fatigue
• Fever and chills
• Infection can spread into lungs, causing shortness of breath
• Cough can be persistent; may produce yellow or greenish sputum

Chronic Obstructive Pulmonary Diseases Video

Click here to view a video on the subject of chronic obstructive pulmonary diseases.

Spontaneous Pneumothorax Animation

Click here to view an animation on the subject of spontaneous pneumothorax.
The Prescribed Inhaler

- Metered-dose inhaler
- Provides a metered (exactly measured) inhaled dose of medication
- Most commonly prescribed for conditions causing bronchoconstriction
The Prescribed Inhaler

- Before administering inhaler
  - Right patient, right medication, right dose, right route
  - Check expiration date
  - Shake inhaler vigorously
  - Patient alert enough to use inhaler
  - Use spacer device if patient has one

Spacer Device

The Prescribed Inhaler

- To administer inhaler
  - Have patient exhale deeply
  - Have patient put lips around opening
  - Press inhaler to activate spray as patient inhales deeply
  - Make sure patient holds breath as long as possible so medication can be absorbed
The Small-Volume Nebulizer

- Medications in metered-dose inhalers can also be administered by a small-volume nebulizer (SVN)
- Nebulizing—running oxygen or air through liquid medication
- Patient breathes vapors created

continued
The Small-Volume Nebulizer

- Produces continuous flow of aerosolized medication that can be taken in during multiple breaths over several minutes
- Gives patient greater exposure to medication

Chapter Review

- It is important to understand the anatomy, physiology, pathophysiology, assessment and care for patients experiencing respiratory emergencies.
- Patients with respiratory complaints may exhibit inadequate breathing.

continued
Chapter Review

• Very slow and shallow respirations are often the end-point of a serious condition and are a precursor to death.

Chapter Review

• The history usually provides significant information about the patient's condition. In addition to determining a pertinent past history and medications, determine the patient's signs and symptoms with a detailed description including OPQRST and events leading up to the episode.

Chapter Review

• Important physical examination points include the patient's work of breathing, accessory muscle use, pulse oximetry readings, assuring adequate and equal lung sounds bilaterally, and examining for excess fluid and vital signs.
• There are several medications which may help a patient's difficulty breathing.
Chapter 19 - Respiratory_Emergencies

Remember

• Determine if the patient’s breathing is adequate, inadequate, or absent.
• Choose the appropriate oxygenation or ventilation therapy.

Questions to Consider

• What would you expect a patient’s respiratory rate to do when the patient gets hypoxic? Why?
• What would you expect a patient’s pulse rate to do when the patient gets hypoxic? Why?
• List the signs of inadequate breathing.
Questions to Consider

- Would you expect to assist a patient with their prescribed inhaler when they are experiencing congestive heart failure? Why or why not?
- List some differences between adult and infant/child respiratory systems.

Critical Thinking

- A 72-year-old female complains of severe shortness of breath. Her husband notes she is confused. You note respiratory rate of 8 breaths/minute and cyanosis. Patient has a history of COPD and CHF. Discuss the treatment steps to assist this patient.

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