Chapter 16

Respiratory Emergencies

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Prehospital Emergency Care
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Objectives

1. Define key terms introduced in this chapter.
2. Explain the importance of being able to quickly recognize and treat patients with respiratory emergencies.
3. Describe the structure and function of the respiratory system, including (slides 15-22):
   a. Upper airway
   b. Lower airway
   c. Gas exchange
   d. Inspiratory and expiratory centers in the medulla and pons
4. Demonstrate the assessment of breath sounds (slides 23-26).

Objectives

5. Describe the characteristics of abnormal breath sounds, including (slides 23-36).
   a. Wheezing
   b. Rhonchi
   c. Crackles (rales)
6. Explain the relationship between dyspnea and hypoxia (slide 28).
7. Differentiate respiratory distress, respiratory failure, and respiratory arrest (slides 29-31).
Objectives

8. Describe the pathophysiology by which each of the following conditions leads to inadequate oxygenation (slides 32-88):
   a. Obstructive pulmonary diseases: emphysema, chronic bronchitis, and asthma
   b. Pneumonia
   c. Pulmonary embolism
   d. Pulmonary edema
   e. Spontaneous pneumothorax
   f. Hyperventilation syndrome
   g. Epiglottitis
   h. Pertussis
   i. Cystic fibrosis
   j. Poisonous exposures
   k. Viral respiratory infections

Objectives

9. As allowed by your scope of practice, demonstrate administering or assisting a patient with self-administration of bronchodilators by metered dose inhaler and/or small-volume nebulizer (slides 92-93).

10. Differentiate between short-acting beta2 agonists appropriate for prehospital use and respiratory medications that are not intended for emergency use (slide 94).

11. Describe special considerations in the assessment and management of pediatric and geriatric patients with respiratory emergencies, including (slides 95-105):
   a. Differences in anatomy and physiology
   b. Causes of respiratory emergencies
   c. Differences in management

Objectives

12. Employ an assessment-based approach in order to recognize indications for the following interventions in patients with respiratory complaints/emergencies (slides 107-109):
   a. Establishing an airway
   b. Administration of oxygen
   c. Positive pressure ventilation
   d. Administration/assistance with self-administration of an inhaled beta2 agonist
   e. Expedited transport
   f. ALS backup
Objectives

13. Given a list of patient medications, recognize medications that are associated with respiratory disease.
14. Use reassessment to identify responses to treatment and changes in the conditions of patients presenting with respiratory complaints and emergencies (slide 109).

Multimedia Directory

Slide 40 Pathophysiology of COPD Video
Slide 47 Pathophysiology of Asthma Video
Slide 89 Pathophysiology of Acute Respiratory Distress Syndrome Animation
Slide 90 Etiology of Tuberculosis Video
Slide 91 How to Use an Oxygen Humidifier Video

Topics

- Respiratory Anatomy, Physiology, and Pathophysiology
- Respiratory Distress
- Pathophysiology of Conditions that Cause Respiratory Distress
- Metered-Dose Inhalers and Small-Volume Nebulizers
- Age-Related Variations: Pediatrics and Geriatrics
- Assessment and Care: General Guidelines
CASE STUDY

Dispatch

EMS Unit 106

Respond to 1449 Porter Avenue, Apartment 322. A 31-year old female is complaining of respiratory distress.

Time out is 1942 hours.

Upon Arrival
How would you proceed to assess and care for this patient?

“I can’t breathe”

Respiratory Anatomy, Physiology, and Pathophysiology
Structures of the Upper Airway

- Nose and mouth
- Pharynx
- Epiglottis
- Larynx

Structures of the Lower Airway

- Trachea
- Bronchi
- Bronchioles
- Lungs
Normal Breathing

- Active inspiration
- Passive exhalation

Abnormal Breathing
As a result of several possibilities
• Increased width
• Lack of perfusion
• Filling of the alveoli

Abnormal Breathing

Assessing Breath Sounds

Wheezing

• High-pitched, musical, whistling
• Constriction of bronchioles
Rhonchi
• Snoring or rattling noises
• Caused by thick mucous secretions

Crackles
• Bubbly or crackling sounds
• Associated with fluid around the alveoli

Respiratory Distress
Terms to Know…

- Hypoxemia
  - Decreased oxygen in blood stream
- Hypoxia
  - Decreased oxygen in the tissues
- Dyspnea
  - Shortness of breath
- Apnea
  - Respiratory arrest

Signs of Respiratory Distress

- Fast or slow respiratory rate
- Retractions
- Cyanosis
- Shallow breaths
- Use of accessory muscles
- Cool, clammy skin
- Irregular rhythm
- Increased effort to breathe
- Nasal flaring
- Tripod position

Causes of Shortness of Breath

- Mechanical disruption
- Stimulation of the receptors
- Inadequate gas exchange
Respiratory Arrest

Can quickly lead to cardiac arrest
Managed with rapid oxygen delivery

Pathophysiology of Conditions That Cause Respiratory Distress

Obstructive Pulmonary Diseases
Emphysema
Emphysema

- Often caused by smoking
- Destruction of alveolar walls
- Carbon dioxide retained

Assessment

- Thin, barrel-chest appearance
- Coughing, nonproductive
- Prolonged exhalation
- Diminished breath sounds
- Wheezing and rhonchi

Assessment

- Pursed-lip breathing
- Difficulty of breathing
- Pink complexion
- Tachypnea
- Tachycardia
- Diaphoresis
- Tripod position
- May be on home oxygen
Obstructive Pulmonary Diseases

Chronic Bronchitis

- Caused by smoking
- Inflammation, swelling, and thickening of the bronchi and bronchioles
- Excessive mucous production

Assessment

- Typically overweight
- Chronic cyanotic complexion
- Difficulty in breathing
- Productive chronic cough
- Coarse rhonchi
- Wheezes and crackles
Pathophysiology of COPD

Click here to view a video on the pathophysiology of COPD.

Return to Directory

Emergency Medical Care

• Treat the same as any patient experiencing shortness of breath
• Hypoxic drive a rare complication

As a general rule, never withhold oxygen from any patient who requires it.
Obstructive Pulmonary Diseases

Asthma

- Bronchospasm, edema, mucus in the lower airways
- Reversible
- Acute, irregular, periodic attacks

Asthma Assessment

- Dyspnea
- Nonproductive cough
- Wheezing
- Tachypnea
- Tachycardia
- Anxiety and apprehension
- Chest tightness
- $\text{SpO}_2 < 95$ percent
Symptoms that Require Ventilation

- Extreme fatigue or exhaustion
- Inability to speak
- Quiet or absent breath sounds
- \( \text{SpO}_2 < 90 \text{ percent with patient on oxygen} \)

Pathophysiology of Asthma

Click here to view a video on the pathophysiology of asthma.

Return to Directory

Emergency Medical Care

- Oxygen
- Beta agonist medication
- Ventilation, in severe cases
- Transport and reassess
Other Diseases That Cause Respiratory Distress

**Pneumonia**

- Common disease of the elderly and those with suppressed immune systems
- Acute infectious disease
- Caused by bacteria or virus

**Assessment**

- Malaise
- Decreased appetite
- Fever
- Cough—productive or nonproductive
- Dyspnea
- Altered mental status
Emergency Medical Care

- Treat the same as any patient experiencing shortness of breath
- May administer metered-dose inhaler or small-volume nebulizer

Other Diseases That Cause Respiratory Distress

Pulmonary Embolism

- Obstruction of blood flow
- Caused by
  - A blood clot
  - Air bubble
  - Fat particle
- Severity depends on location
Assessment

- Sudden onset of
  - Dyspnea
  - Respiratory distress
  - Stabbing chest pain
- Cough (may cough up blood)
- Tachypnea
- Tachycardia
- Cool, moist skin
- Restlessness, anxiety

Emergency Medical Care

- Assess and manage patient’s airway
  - Ventilate if necessary
- Transport Immediately

Other Diseases That Cause Respiratory Distress

Acute Pulmonary Edema
Acute Pulmonary Edema

• Fluid collects in the spaces
• Cardiogenic versus noncardiogenic

Assessment

• Tachycardia
• Anxiety
• Tripod position
• Crackles
• Cyanosis
• Pale skin
• Swollen lower extremities
• Cough

Manage the patient’s airway

• Positive pressure ventilation may be necessary
• May improve the patient’s status

Emergency Medical Care
Other Diseases That Cause Respiratory Distress

Spontaneous Pneumothorax

- Sudden rupture of the visceral lining
- More likely in tall, thin males
- Change in pressure causes lung to collapse

Assessment

- Sudden onset of
  - Shortness of breath
  - Chest pain or shoulder pain
  - Decreased breath sounds on one side

- Tachypnea
- Diaphoresis
Emergency Medical Care

- Treat shortness of breath
- Be prepared to support ventilations
- Monitor for signs of a tension pneumothorax

Other Diseases That Cause Respiratory Distress

**Hyperventilation Syndrome**

- Patient feels anxious and unable to catch breath
- Patient "blows off" excessive amounts of CO₂
- Causes signs and symptoms to worsen
- Causes hyperventilation to increase
Assessment

- Nervousness and anxiety
- Dizziness
- Shortness of breath
- Chest tightness
- Numbness and tingling around the mouth, hands, and feet
- Tachypnea
- Carpopedal spasm

Emergency Medical Care

- Coach patient to slow down breathing
  - NEVER use a paper bag
  - NEVER withhold oxygen
- If possible, remove the source of anxiety

Other Diseases That Cause Respiratory Distress

Epiglottitis
Epiglottitis

• Inflammation of upper airway
• Becoming more common in adults
• Can be life threatening

Assessment

• High fever
• Sore throat
• Drooling
• Anxiety and apprehension
• Tripod position
• Fatigue
• Inspiratory stridor

Emergency Medical Care

• Administer O₂
• Keep patient calm
• Rapid transport
• Consider ALS intercept
• BVM if necessary
Other Diseases That Cause Respiratory Distress

Pertussis

- Whooping cough
- Similar to cold at start
- Rapid coughing
- Leads to complications

Assessment

- History of upper respiratory infection
- Coughing fits
- "Whoop" heard at end of cough
- Dyspnea during cough
Emergency Medical Care

- Calm patient
- Administer oxygen
- Expedite transport
- Consider ALS
- Decontaminate ambulance afterward

Other Diseases That Cause Respiratory Distress

Cystic Fibrosis

- Hereditary disease
- Diagnosed early in life
- No cure
- Causes pulmonary failure
Assessment

- Known history of cystic fibrosis
- Recurrent coughing
- Fever
- Expectoration of thick mucus
- Recurrent infections
- Trouble speaking and breathing

Emergency Medical Care

- Provide O₂ via nonrebreather mask
- Consider saline nebulizer (per protocol)
- Move patient into position of comfort
- Consider ALS intercept

Other Diseases That Cause Respiratory Distress

Poisonous Exposures
Poisonous Exposures

Any type of inhalation injury that occurs secondary to exposure to a toxic substance(s)

Assessment

- History consistent with an inhalation injury
- Presence of chemicals about the face from the exposure
- Findings of respiratory distress

Emergency Medical Care

- EMS safety first
- Rescue patients
- ABCs
- Provide O₂
- Gather information regarding exposure
- Consider ALS intercept
Other Diseases That Cause Respiratory Distress

Viral Respiratory Infections

- Common to all age groups; most serious in children
- Caused by many viruses
- Can lead to more serious infections

Assessment

- Nasal congestion
- Sore throat
- Mild respiratory distress
- Fever
- Malaise
- Poor feeding habits
Emergency Medical Care

- Treat symptoms
- Put patient in position of comfort
- Monitor for changes

Pathophysiology of Acute Respiratory Distress Syndrome

Click here to view an animation on the pathophysiology of acute respiratory distress syndrome.

Etiology of Tuberculosis

Click here to view a video on the etiology of tuberculosis.
How to Use an Oxygen Humidifier

Click here to view a video on how to use an oxygen humidifier.

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Metered-Dose Inhalers and Small-Volume Nebulizers

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Inhalers and Nebulizers

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Medication is deposited on site of bronchoconstriction.

See skill slides for proper administration.

Back to Objectives
Age-Related Variations: Pediatrics and Geriatrics

Pediatric Patients
Primary assessment
• Rule out trauma first
• Spot signs in general impression

Respiratory Distress in the Pediatric Patient: Assessment and Care

Signs of Respiratory Distress
- Flared nostrils
- Neck muscle retractions
- Supraventricular retractions
- Intercostal retractions
- "See-saw" respirations

Monitor for worsening condition.
Begin immediate positive pressure ventilations.

**Respiratory Failure**
- Altered mental status
- Bradycardia
- Hypotension
- Irregular breathing pattern

Geriatric Patients

- Rule out trauma first
- Spot signs in primary assessment
- Patient will deteriorate rapidly
Respiratory Distress in the Geriatric Patient: Assessment and Care

Respiratory Distress
- Retractions
- Accessory muscle use
- Tachypnea
- Tachycardia
- Nasal flaring

Respiratory Failure
- Diminished or absent lung sounds
- Altered mental status
- Irregular breathing pattern
- Cyanosis
Assessment and Care: General Guidelines

Assessment-Based Approach: Respiratory Distress

Scene size-up
Primary assessment
ABCs
Transport priority

Transport priority
CASE STUDY

Follow-Up

Assessment

- S: Audible wheezing and accessory muscle use; speaking in single words
- A: PCN
- M: Albuterol
- P: Asthma
- L: Orange juice about one hour ago
- E: Cleaning house prior to episode
- BP: 134/86; P: 118; RR: 32; SpO₂: 88 percent
Reassessment following Albuterol® administration:
- BP: 130/84, P: 90, RR: 18, SpO₂: 96%
- Audible wheezes minimal
- Speaking in full sentences

Critical Thinking Scenario
- 72-year-old female in severe respiratory distress
- She presents sitting up in her recliner in her living room
- As you ask her name, she can barely say it
- She looks very fatigued, her head is bobbing with each breath, and she is gasping
- History of CHF, two previous MIs, and hypertension

Critical Thinking Scenario
Vital signs:
- BP: 92/70 mmHg
- Radial pulse is weak and rapid
- RR: 36 per minute, shallow tidal volume
- SpO₂: 82 percent
- Skin is extremely pale, very cool, and diaphoretic with circumoral cyanosis
- Nail beds and fingertips are cyanotic
Critical Thinking Questions

1. What would be the immediate emergency care provided during the primary assessment?
2. What is the respiratory status of the patient?
3. How would you manage the respiratory status of the patient?
4. What would you expect to find upon auscultation of the lungs?

Critical Thinking Questions

5. What areas of the lungs would be most important to auscultate?
6. What would be the most effective method to increase oxygenation in the patient?

Reinforce and Review

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