Chapter 16
Respiratory Emergencies
U.S. DOT Objectives are covered and/or supported by the PowerPoint™ Slide Program and Notes for Emergency Care, 11th Ed. Please see the Chapter 16 correlation below.

**KNOWLEDGE AND ATTITUDE**

- **4-2.1** List the structure and function of the respiratory system. Slides 5-18
- **4-2.2** State the signs and symptoms of a patient with breathing difficulty. Slides 25-35, 42-43, 46-48, 51-56
- **4-2.3** Describe the emergency medical care of the patient with breathing difficulty. Slides 24, 57-67, 73-87
- **4-2.4** Recognize the need for medical direction to assist in the emergency medical care of the patient with breathing difficulty. Slides 73, 76-77, 83, 87
- **4-2.5** Describe the emergency medical care of the patient with breathing distress. Slides 57-67
- **4-2.6** Establish the relationship between airway management and the patient with breathing difficulty. Slide 58
- **4-2.7** List signs of adequate air exchange. Slides 19-24

(cont.)
U.S. DOT Objectives Directory

*KNOWLEDGE AND ATTITUDE

- 4-2.8 State the generic name, medication forms, dose, administration, action, indications, and contraindications for the prescribed inhaler. Slides 73-81
- 4-2.9 Distinguish between the emergency medical care of the infant, child, and adult patient with breathing difficulty. Slides 24, 57-67, 73-87
- 4-2.10 Differentiate between upper airway obstruction and lower airway disease in the infant and child patient. Slides 23-24
- 4-2.11 Defend EMT treatment regimens for various respiratory emergencies. Slides 24, 57-67, 73-87
- 4-2.12 Explain the rationale for administering an inhaler. Slides 73-84

(cont.)
**SKILLS**

- 4-2.13 Demonstrate the emergency medical care for breathing difficulty.
- 4-2.14 Perform the steps in facilitating the use of an inhaler.
Anatomy Review
Anatomy Review

DOT Directory

Limmer et al., Emergency Care, 11th Edition

(cont.)
Anatomy Review

(cont.)
Anatomy Review

Blood from the right side of the heart enters the pulmonary capillary.

Deoxygenated blood has low levels of O₂ and high levels of CO₂.

Capillary

Red blood cells

Oxygenated blood has high levels of O₂ and low levels of CO₂.

Alveolus

Blood leaves the capillary and is transported back to the left side of the heart.

(continues...)
Anatomy Review

- Thoracic wall
- Trachea
- Parietal pleura
- Visceral pleura
- Bronchus
- Lungs
- Mediastinum
- Diaphragm
Pediatric Anatomy

Airway structure differences:

- Proportionally larger tongue
- Smaller, more flexible trachea
- Abdominal breathers
The respiratory tree, the diaphragm, and other parts of the body work together to allow the body to inhale (breathe in) and exhale (breathe out).
Process of Breathing
Respiratory Cycle

* Composed of two phases:

- Inspiration (breathing in)
- Exhalation (breathing out)

Each phase is of equal importance!
Inspiration

Active process requiring muscles to have energy and function
Inspiration

1. Diaphragm and intercostal (rib) muscles contract.
2. Diaphragm moves downward.
3. Ribs move upward and outward, expanding chest cavity size.
4. Larger chest size allows air to flow into lungs.
Passive process allowing muscles to relax
Exhalation

1. Diaphragm rises.

2. Ribs move downward and inward, decreasing chest cavity size.

3. Smaller chest size allows air to flow out of lungs.
Inspiration and Exhalation

RELAXED

CONTRACTION
Inspiration begins

INSPIRATION

RELAXED
Passive expiration begins
Evaluation

Start with one question: 
*Is the breathing adequate or inadequate?*
Adequate Breathing

- Adequate breathing falls within certain ranges that are considered “normal.” The patient will not appear to be in distress.

- Adequate breathing is breathing that is sufficient to support life.
Adequate Breathing

- Skin color normal
- Normal mental status
- Evaluate rate, rhythm, and quality
Inadequate Breathing

- Inadequate breathing is breathing that is not sufficient to support life.
- If left untreated, this condition will surely lead to death.
Inadequate Breathing in Pediatrics

Most prominent signs:

- Nasal flaring
- Grunting
- Retractions and see-saw breathing
Inadequate Breathing in Pediatrics

- Leading killer of children
- Rapid deterioration and “crashing” of these patients—rapid treatment and assessment is critical!
Evaluation of Breathing
Breathing Difficulty

* Frequent chief complaint
* May also complain of chest tightness, anxiety, or restlessness
* Do not rely completely on patient’s perception, but rather on full patient assessment.
* May be a chronic problem or an acute onset
Signs of Breathing Difficulty

- Increased or decreased pulse rate
- Pale, cyanotic skin
- Noisy breathing (gurgling, snoring, wheezing, etc.)
- Accessory muscle use

(cont.)
Signs of Breathing Difficulty

- Change in mental status
- Flared nostrils, pursed lips
- Positioning (tripod)
Signs of Breathing Difficulty

- Altered levels of awareness, unconsciousness, dizziness, fainting, restlessness, anxiety, confusion, combativeness
- Cyanosis
- Straining neck and facial muscles
- Tightness in chest (stabbing chest pains in some patients)
- Straining intercostal and abdominal muscles
- Numbness or tingling in hands and feet
- Flaring nostrils
  - Pursed lips
- Coughing, crowing, high-pitched barking
- Respiratory noises
  - Wheezing
  - Rattling
- Tripod position

© Ray Kemp/911 Imaging
Respiratory Rate

Normal rates:
- Adult: 12–20/min.
- Child: 15–30/min.
- Infant: 25–50/min.

Critical finding:
- Very slow or very fast rates
Respiratory Rhythm

* Usually regular
* Breaths taken at regular intervals
* Breaths last for approximately same length of time
* May be influenced by talking, coughing, etc.

* Critical finding:
  – Irregular (not an absolute indicator)
Respiratory Quality

- Measure by watching for equal chest rise.
- Measure by feeling chest wall for equal expansion during inspiration.
- Listen with stethoscope for abnormal noises.

(cont.)
Respiratory Quality

Critical findings:

- Shallow or gasping
- “Noisy” lung sounds
- Unequal expansion
- Accessory muscle use
- Pale, cyanotic, or clammy skin
Pulse Oximetry

- If possible, place immediately to obtain “room air” reading.
- Never delay oxygen administration to obtain a reading.
Pulse Oximetry

- Normal reading is 96% to 100%.
- Below 96% indicates hypoxia
  - 91% to 95% = mild hypoxia
  - 86% to 90% = moderate hypoxia
  - 85% or less = severe hypoxia

Regardless of the reading, ANY patient in distress should receive oxygen.
Causes of Respiratory Distress

- May be result of an acute problem
  - Trauma (chest injuries, head injuries)
  - Medical condition (heart attack, allergic reaction)
  - Other conditions (drowning, vomiting)
  - Anxiety, stress

(cont.)
Causes of Respiratory Distress

* Respiratory condition
  - COPD
    * Chronic bronchitis
    * Emphysema
  - Asthma

(cont.)
Causes of Respiratory Distress

Click here to view a video on chronic obstructive pulmonary disease.
Chronic Obstructive Pulmonary Disease (COPD)

- Includes emphysema, chronic bronchitis, and black lung
- Generally affects older patients
- Affects patient continuously
- Causes include cigarette smoking, chemical exposure, and pollution
COPD—Chronic Bronchitis

- Inflammation of bronchiole lining
- Produces excess mucus
- Damage to or destruction of cilia prevents removal of this mucus
COPD—Chronic Bronchitis

A major problem with chronic bronchitis is the swelling and thickening of the lining of the lower airways and an increase in mucus production.
Chronic Bronchitis: Signs and Symptoms

- Typically overweight
- Chronic cyanotic complexion (Chronic bronchitis patients are often called “blue bloaters.”)
- Difficulty in breathing, but less prominent than with emphysema
Chronic Bronchitis: Signs and Symptoms

- Coarse rhonchi usually heard upon auscultation of the lungs
- Vigorous productive cough with sputum (material that is coughed up)
- Wheezes and, possibly, crackles at the bases of the lungs
COPD—Chronic Bronchitis
COPD—Emphysema

- Breakdown of alveolar walls
- Reduced surface area for exchange of oxygen and carbon dioxide
- Reduced elasticity of lungs

(cont.)
COPD—Emphysema

- Thickened mucosa
- Bronchospasm
- Mucus
- Collapsed bronchiole
- Decreased elasticity
- Trapped air in alveoli
Emphysema: Signs and Symptoms

- Thin, barrel chest appearance
- Coughing, but with little sputum (material that is coughed up)
- Prolonged exhalation
- Diminished breath sounds
- Wheezing and rhonchi (rattles) on auscultation
- Pursed-lip breathing

(cont.)
Emphysema: Signs and Symptoms

- Extreme difficulty of breathing on minimal exertion
- Pink complexion (Emphysema patients are often called “pink puffers.”)
- Tachypnea—breathing rate usually greater than 20 per minute at rest
- Tripod position
- May be on home oxygen
Asthma

- Episodic disease
- Narrowing of bronchioles and overproduction of mucus
- Typically one-directional, allowing air into lungs but requiring forceful exhalation (wheezing)
Asthma

Variety of causes:
- Allergic reactions
- Pollutants
- Exercise and stress

(cont.)
Asthma

- Bronchus
- Bronchiole
- Smooth muscle constriction
- Alveoli
- Mucus plug
- Mucus accumulation
- Edema of bronchial lining
Lung Sounds
Stridor

Stridor is usually caused by a blockage in the throat or larynx (voice box), and it is typically heard when the patient inhales.

Click here to hear a sample of stridor

Please make sure you have the QuickTime plug-in installed on your local browser. You may install this plug-in from the “Installer Folder” on this CD.
Rhonchi

Rhonchi are snoring or rattling noises heard upon auscultation. They can indicate obstruction by thick secretions of mucus. They are often heard in chronic bronchitis, emphysema, aspiration, and pneumonia.

Click here to hear a sample of rhonchi

Please make sure you have the QuickTime plug-in installed on your local browser. You may install this plug-in from the “Installer Folder” on this CD.
Crackles (Rales)

Crackles, also known as “rales,” are bubbly, popping sounds heard upon inhalation. These sounds are associated with fluid that has surrounded or filled the alveoli or small bronchioles. Crackles may indicate pulmonary edema or pneumonia.

- **Fine**: Crackles are intermittent popping sounds.
- **Coarse**: Coarse crackles are lower pitched and longer in duration than fine crackles.

Click the above terms to hear a sample of crackles

Please make sure you have the QuickTime plug-in installed on your local browser. You may install this plug-in from the “Installer Folder” on this CD.
Wheezees

Wheezees

- Wheezing is a high-pitched musical sound heard upon inhalation and exhalation. Wheezing is usually due to swelling or spasms along the lower airway.

Click here to listen to a sample of wheezing

Please make sure you have the QuickTime plug-in installed on your local browser. You may install this plug-in from the “Installer Folder” on this CD.
Treatment of Respiratory Emergencies

Evaluate patient for need to provide ventilation or supplement breathing.
General Treatment Considerations

- Ensure open airway.
  - Jaw-thrust or head-tilt, chin-lift
- Perform abdominal thrusts as needed.
- Insert oral/nasal airway as needed.
- Suction secretions and fluids as needed.
Artificial Ventilation
Artificial Ventilation

Provide through (in order of need):

- Pocket face mask with supplemental oxygen
- Two-rescuer bag-valve mask with supplemental oxygen
Artificial Ventilation

- One-rescuer bag-valve mask with supplemental oxygen
- Flow-restricted, oxygen-powered ventilation device (FROPVD)

(cont.)
Artificial Ventilation

- Ensure chest rise and fall.
- Rate of 12 breaths per minute for adults, 20 breaths per minute for children

(cont.)
Artificial Ventilation

* Monitor for a return to normal pulse rate and improved skin color.
Methods of Artificial Ventilation
Supplementing Breathing

- Provide supplemental oxygen for patients with adequate respirations.
- Deliver oxygen through nonrebreather mask (12 to 15 liters per minute) or nasal cannula (2 to 6 liters per minute).
- Carefully monitor to ensure that ventilations are adequate.
Nasal Cannula
Positioning

- May significantly help patient with proper positioning
- Patient may have placed himself in a “position of comfort” that allows best ability to breathe.
- If not in a position of comfort, place patient in upright sitting position for best results.
Patient Interview

- Conduct after initiation of oxygen therapy.
- Use OPQRST and SAMPLE as guides for questions.
- If patient has difficulty breathing, use family/friends to help with answers.

(cont.)
Patient Interview

* O—Onset
  - When did it begin?

* P—Provocation
  - What were you doing when it began?

* Q—Quality
  - Can you describe the feeling you have?

(cont.)
Patient Interview

* R—Radiation
  - Does the feeling spread to any other parts of your body?

* S—Severity
  - On a scale of 1–10, how bad is the trouble breathing? (1 is best, and 10 is worst.) How does this compare to previous episodes?

(cont.)
Patient Interview

T—Time

– How long have you had this feeling?
Patient Interview

- Use SAMPLE to gain additional knowledge about the patient’s condition.

- Medications that the patient takes may influence treatment options.
Prescribed Inhaler
Prescribed Inhaler
Prescribed Inhaler

Medication name:
- Generic: albuterol, isoetharine, etc.
- Trade: Proventil, Ventolin, Alupent, etc.
Prescribed Inhaler

**Indications:**

- Signs/symptoms of breathing difficulty
- Prescribed by physician
- Specific authorization by medical direction

*Patient must meet all criteria.*
Prescribed Inhaler

Contraindications:

- Inability of patient to use device
- Inhaler not prescribed
- No permission from medical direction
- Patient has used maximum dose

(cont.)
Prescribed Inhaler

- **Medication form:**
  - Metered-dose inhaler

- **Dosage:**
  - Number of inhalations based on physician order

(cont.)
Prescribed Inhaler

Actions:

- Beta agonist
- Dilates bronchioles
- Reduces airway resistance
Prescribed Inhaler

Side effects:

- Increased pulse rate
- Tremors
- Nervousness
Prescribed Inhaler

Reassessment:

- Vital signs
- Focused reassessment
- Be alert for development of inadequate breathing.
Prescribed Inhaler

- Check the expiration date.
- Make sure the patient is alert and able to use device.
- Be sure inhaler is at room temperature or warmer.
- Determine if patient has already used inhaler and the number of times it has been used.

(cont.)
Prescribed Inhaler

Children

– Commonly prescribed
– Retractions more common
– Coughing more common than wheezing
Spacer Device
Small-Volume Nebulizer

- The medications used in metered-dose inhalers can also be administered by small-volume nebulizer (SVN).
- Nebulizing a medication involves taking a liquid medication and running oxygen or air through it.
A few states have begun to allow EMTs to carry and administer nebulized medications such as albuterol, while other states may allow EMTs to assist with a home nebulizer when allowed by medical direction.
Review Questions

1. List the normal rates of breathing for adults, children, and infants. List the other signs of adequate breathing.

2. List the signs of inadequate breathing.

3. Explain the treatment you will give, as an EMT, when a patient’s breathing is inadequate.

(cont.)
Review Questions

4. List the signs and symptoms of breathing difficulty.

5. Explain the treatments you may give, as an EMT, for breathing difficulty when breathing is adequate.

6. Explain the steps to follow before, during, and after helping a patient to use a prescribed inhaler.

(cont.)
7. List some differences between adult and infant/child respiratory systems.

8. List some special considerations in the assessment and treatment of infants and children with respiratory problems.
Street Scenes

★ What is the first thing you should do for this patient?
★ What questions should you ask the husband? The neighbor?
★ What is the significance of the medical history provided by the husband?

(cont.)
Street Scenes

- How much oxygen should the patient receive?
- Is the patient a good candidate for use of an inhaler?
- Should this patient be considered a high priority with red light and siren for transport to the hospital?
**Sample Documentation**

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<th>PATIENT NAME: Carmela Bartolone</th>
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<tbody>
<tr>
<td>CHIEF COMPLAINT: Dyspnea</td>
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<tr>
<td>PAST MEDICAL HISTORY: Emphysema</td>
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<td>Current Medications (List): 2 LPM O₂ by NC, ipratropium &amp; albuterol inhalers</td>
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<th>VITAL SIGNS</th>
<th>TIME</th>
<th>RESP</th>
<th>PULSE</th>
<th>B.P.</th>
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<td>Assisted</td>
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<th>R PUPILS</th>
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<tr>
<td>Alert</td>
<td>Voice</td>
<td>Pain</td>
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**NARRATIVE**
74-year-old female patient found in her yard complaining of severe difficulty in breathing which began while working in the garden. Patient was unable to speak in full sentences. She was using accessory muscles to breathe, displayed nasal flaring, and had cyanosis about the lips. Shortly after our arrival the patient became drowsy. We provided assisted ventilations via BVM with supplemental oxygen.

Patient has a history of smoking and emphysema. An episode similar to this about 6 months ago resulted in the patient being intubated and placed on a ventilator. Patient did not experience relief from rest. She denies chest pain or other complaints. She is on oxygen via cannula at home. Patient transported to the hospital. BVM assisted ventilations continued en route. Patient’s condition improved slightly with assisted ventilations (increased level of consciousness). Unable to obtain second set of vital signs due to insufficient personnel and assisting ventilations.