CHAPTER 16

Respiratory Emergencies
Anatomy Review

Bronchiole

Alveolus
Pediatric Anatomy

- Airway structure differences
  - Proportionally larger tongue
  - Smaller, more flexible trachea
  - Abdominal breathers

Limmer et al., *Emergency Care Update, 10th Edition*
Reasons for Breathing

- 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).
Each breath allows:

- Oxygen to enter the alveoli and pass into the capillaries (bloodstream) to be used by the body
- Waste (carbon dioxide) produced by the body to exit the capillaries into the alveoli
Oxygen Demand

- The body requires a certain amount of oxygen for all activities.
- As workload increases, oxygen demand and use increase.
- As a result, waste production increases.
Oxygen Demand

* A patient must inhale to provide more oxygen, and just as important, exhale to get rid of increasing waste.
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 & function
Inspiration

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

*Passive process allowing muscles to relax*
Exhalation

1. Diaphragm rises.
2. Ribs move downward & inward, decreasing chest cavity size.
3. Smaller chest size allows air to flow out of lungs.
Inspiration & Exhalation

INSPIRATIONS AND EXPIRATIONS

RELAXED

CONTRACTION
Inspiration begins

INSPIRATION

RELAXED
Passive expiration begins
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

Continued…
Causes of Respiratory Distress

- May be a chronic condition
  - COPD
  - Asthma
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 or destruction of cilia prevents removal of this mucus
COPD – Emphysema

- Breakdown of alveoli walls
- Reduces surface area for exchange of oxygen and carbon dioxide
- Reduced elasticity of lungs
Asthma

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

Continued…
Asthma

- Variety of causes
  - Allergic reactions
  - Pollutants
  - Exercise & stress
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

Continued…
Signs of Breathing Difficulty

- Change in mental status
- Flared nostrils, pursed lips
- Positioning (tripod)
Signs of breathing difficulty.
Evaluation of breathing is based on the single question:

*Is the breathing adequate or inadequate?*
Adequate Breathing

- Sufficient to support life
- No obvious distress
- Able to speak in full sentences without stopping for breath

Continued…
Adequate Breathing

- Skin color normal
- Normal mental status
- Evaluate rate, rhythm, and quality
Respiratory Rate

Normal Rates

- Adult  12-20/minute
- Child  15-30/minute
- Infant 25-50/minute

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.

Limmer et al., *Emergency Care Update, 10th Edition*
Critical findings:
- Shallow or gasping
- “Noisy” lung sounds
- Unequal expansion
- Accessory muscle use
- Pale, cyanotic, or clammy skin
Inadequate Breathing

Inadequate breathing is the EMT–B’s #1 treatment priority!

- Not sufficient to support life
- Must continuously monitor for changes:
  - Any critical rate finding
  - Any critical rhythm finding
  - Any critical quality finding
Inadequate Breathing in Pediatrics

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

Continued…
Inadequate Breathing in Pediatrics

* More prominent signs include:
  * Nasal flaring
  * Grunting
  * Retractions & seesaw breathing
Pulse Oximetry

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

* Normal reading is 95% to 99%
* Below 95% indicates hypoxia
  * 91% to 94% = mild hypoxia
  * 86% to 90% = moderate hypoxia
  * 85% or less = severe hypoxia

Regardless of the reading, ANY patient in distress should receive oxygen.
Lung Sounds
Wheeze

Wheezing is a high pitched musical sound heard upon inhalation and exhalation. Wheezes is usually due to swelling or spasms along the lower airway. Wheezing often sounds serious but is not usually associated with airway obstruction.

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.
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 here 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.
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.
Stridor

Stridor is usually caused by a blockage in the throat or larynx (voice box) and 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.
Evaluate patient for need to provide ventilation or supplement breathing
General Treatment Considerations

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

Provided through (in order of preference):

• Pocket face mask with supplemental oxygen

• 2 rescuer bag-valve mask with supplemental oxygen

Continued…
Providing Artificial Ventilation

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

Evaluating Artificial Ventilation

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

Continued…
Evaluating Artificial Ventilation

- Monitor for a return to normal pulse rate and improved skin color.

- Continued…
Artificial Ventilation
Methods of Artificial Ventilation

Limmer et al., *Emergency Care Update, 10th Edition*
Supplementing Breathing

- Provided for patients with adequate respirations.
- Delivered 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.
Positioning

- May significantly help patient with proper positioning.
- Patient may have placed themselves in “position of comfort” that allows best ability to breathe.
- If not, 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.
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?
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, 10 worst). How does this compare to previous episodes?

Continued…
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

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
Prescribed Inhaler

<table>
<thead>
<tr>
<th>Medication Form</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Metered-dose inhaler</td>
<td>* Number of inhalations based on physician order</td>
</tr>
</tbody>
</table>
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.

Limmer et al., Emergency Care Update, 10th Edition
Obtain orders from medical direction.
Prescribed Inhaler

- Check the expiration date.
- Make sure the patient is alert and able to use device.
Prescribed Inhaler

- Be sure inhaler is at room temperature or warmer.
- Determine if patient has already used inhaler and the number of times.
Right patient?  
Right dose?  
Right medication?  
Right route?
Shake vigorously.
Prescribed Inhaler

- Have patient exhale deeply.
- Have patient place lips around inhaler opening.
Depress hand-held inhaler as patient inhales deeply.
Instruct patient to hold breath.
Allow patient to breathe. Repeat dose if ordered.
Reevaluate patient.
Spacer Device
Prescribed Inhaler

- Children
  - Commonly prescribed
  - Retractions more common
  - Coughing more common than wheezing

Limmer et al., *Emergency Care Update, 10th Edition*
1. Describe signs of adequate and inadequate breathing.

2. List signs of adequate and inadequate artificial ventilation.
Review Questions

3. List signs and symptoms of breathing difficulty.

4. List the indications and contraindications of a prescribed inhaler.

5. Describe the procedure for assisting a patient with a prescribed inhaler.
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?
How much oxygen should the patient receive?

Is the patient a good candidate for an inhaler?

Should this patient be considered a high priority with red light and siren for transport to the hospital?
### Sample Documentation

**PATIENT NAME:** Carmela Bartolone  
**PATIENT AGE:** 74

<table>
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<th>CHIEF COMPLAINT</th>
<th>TIME</th>
<th>RESP</th>
<th>PULSE</th>
<th>B.P.</th>
<th>MENTAL STATUS</th>
<th>R PUPILS L</th>
<th>SKIN</th>
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<td></td>
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<td>Irregular</td>
<td></td>
<td>Pain</td>
<td>Constricted</td>
<td>Pale</td>
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<tr>
<td></td>
<td></td>
<td>Laborad</td>
<td></td>
<td></td>
<td>Unresp</td>
<td>Sluggish</td>
<td>Cynotic</td>
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<td></td>
<td></td>
<td></td>
<td>Dry</td>
<td>Jaundiced</td>
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### Past Medical History

- None
- Allergy to
- Hypertension
- Stroke
- Seizures
- Diabetes
- COPD
- Cardiac
- Other (List): Emphysema
- Other (List): Asthma

### Vital Signs

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<th>RESP</th>
<th>PULSE</th>
<th>B.P.</th>
<th>MENTAL STATUS</th>
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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 enroute. 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.