Part I: Nursing Assessment
Respiratory System

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Structures and Functions of Respiratory System

- Structures
- Pulmonary functional unit
- Ciliated mucus membrane

Anatomical Landmarks

Chest wall descriptors
- Anterior landmarks
  - Midclavicular lines
  - Midscapular lines
- Posterior landmarks
  - Mid-scapular line
  - Mid-scapular line

Structures and Functions of Respiratory System

- Upper Respiratory Tract
- Lower Respiratory Tract
Lower Airway Structures

<table>
<thead>
<tr>
<th>Conducting Airways</th>
<th>Respiratory Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trachea</td>
<td>Bronchi, bronchial bronchi</td>
</tr>
<tr>
<td></td>
<td>Sub-segmental bronchi</td>
</tr>
<tr>
<td></td>
<td>Bronchiole segmental bronchi</td>
</tr>
<tr>
<td></td>
<td>Alveolar ducts, alveoli</td>
</tr>
<tr>
<td></td>
<td>Non-respiratory</td>
</tr>
<tr>
<td>Generations</td>
<td>8 15 21-22 24 28</td>
</tr>
</tbody>
</table>

Fig. 26-3. Structures of lower airways.

Atalectasis: Collapsed Alveoli

Respiratory Membrane

Structures and Functions of Respiratory System

- Lower Respiratory Tract Factors
  - Surfactant
  - Blood supply
  - Chest Wall
Structures and Functions of Respiratory System

• Physiology of Respiration
  • Ventilation
  • Compliance
  • Diffusion
  • Oxygen-hemoglobin dissociation curve

Oxygen-Hemoglobin Dissociation Curve

Normal Arterial Blood Gases

ABG's

<table>
<thead>
<tr>
<th>ARTERIAL BLOOD GASES</th>
<th>1 MILE ABOVE SEA LEVEL</th>
<th>LABORATORY VALUE</th>
<th>VENOUS BLOOD GASES</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.36±0.06</td>
<td>7.36±0.06</td>
<td>pH</td>
</tr>
<tr>
<td>PaO₂f (mm Hg)</td>
<td>90-108</td>
<td>65-75</td>
<td>PaO₂ (mm Hg)</td>
</tr>
<tr>
<td>SatO₂ (%)</td>
<td>&gt;96%</td>
<td>&gt;88%</td>
<td>SvO₂ (%)</td>
</tr>
<tr>
<td>PaCO₂ (mm Hg)</td>
<td>32-48</td>
<td>32-48</td>
<td>PCO₂ (mm Hg)</td>
</tr>
<tr>
<td>HCO₃⁻ (mEq/L, mmol/L)</td>
<td>22-24</td>
<td>22-24</td>
<td>HCO₃⁻ (mEq/L, mmol/L)</td>
</tr>
</tbody>
</table>

Physiology of Respiration

• Mixed venous blood gases
• Oximetry
Structures and Functions of Respiratory System

Respiratory Control

• Chemoreceptors
• Mechanical receptors

Respiratory Defense Mechanisms

• Filtration of air
• Mucociliary clearance system
• Cough reflex
• Reflex bronchoconstriction
• Alveolar macrophages

Gerontologic Considerations: Aging Respiratory System

Table 26-3. Critical Values for PaO₂ and Spo₂.*

<table>
<thead>
<tr>
<th>PaO₂ (kPa)</th>
<th>Spo₂ (%)</th>
<th>CONSIDERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;70</td>
<td>&lt;84</td>
<td>Adequate unless patient is hemodynamically unstable or undergoing dialysis or anesthesia.</td>
</tr>
<tr>
<td>70–80</td>
<td>84–90</td>
<td>Adequate.</td>
</tr>
<tr>
<td>80–90</td>
<td>90–94</td>
<td>Adequate in almost all patients. Values are at upper part of normal respiratory curve. Provides adequate oxygenation but with less range for error in that level.</td>
</tr>
<tr>
<td>90–100</td>
<td>94–98</td>
<td>Adequate to ensure tissues are oxygenated properly. No respiratory problems occur. These values are also used as criteria for prescription of continuous O₂ therapy.</td>
</tr>
<tr>
<td>&gt;100</td>
<td>&gt;98</td>
<td>Adequate. Usually can be tolerated for a short-term basis if the patient also has CO₂ retention in this situation, arterial lines may be inserted by a lower PaO₂ than the PaO₂ cannot be fixed rapidly. Tissue hypoxia and carbon dioxide retention can be expected.</td>
</tr>
</tbody>
</table>

*The same critical values apply for PaCO₂ and Spo₂. Values pertain to rest or exercise.
Assessment: Subjective Data

- Past health history
- Medications
- Surgery or other treatments
- Functional health patterns
- Health perception-health management pattern
- Nutritional-metabolic pattern
- Elimination pattern
- Activity-exercise pattern

Functional Health Patterns (continued)

- Sleep-rest pattern
- Cognitive-perceptual pattern
- Self-perception-self-concept pattern
- Role-relationship pattern
- Sexuality-reproductive pattern
- Coping-stress tolerance pattern
- Values-belief pattern

Assessment: Objective Data

- Physical examination
- Nose
- Mouth and pharynx
- Neck
- Thorax and lungs
  - Inspection
  - Palpation
  - Percussion
  - Auscultation

Assessment: Thoracic Expansion
**Assessment: Percussion**

**TABLE 26-6 PERCUSSION SOUNDS**

<table>
<thead>
<tr>
<th>SOUND</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resonance</td>
<td>Low-pitched sound heard over normal lungs</td>
</tr>
<tr>
<td>Hyperresonance</td>
<td>Loud, lower-pitched sound than normal resonance heard over hyperinflated lungs, such as in chronic obstructive lung disease and acute asthma</td>
</tr>
<tr>
<td>Tympany</td>
<td>Sound with drumlike, loud, empty quality heard over gas-filled stomach or intestine, or pneumothorax</td>
</tr>
<tr>
<td>Dell</td>
<td>Sound with medium-intensity pitch and duration heard over areas of “mixed” solid and lung tissue, such as over top area of liver, partially consolidated lung tissue (pneumonia), or fluid-filled pleural space</td>
</tr>
<tr>
<td>Flat</td>
<td>Soft, high-pitched sound of short duration heard over very dense tissue where air is not present, such as posterior chest below level of diaphragm</td>
</tr>
</tbody>
</table>

**Auscultation Sequence**

Listen for 1 breath cycle at each site.

**Assessment: Percussion of Chest**

**Posterior Percussion**
Normal Auscultation

Physical Assessment of Respiratory System (normal)

Diagnostic Studies

- Sputum Studies
- Skin Tests
- Endoscopic Examinations
  - Bronchoscopy
- CT scan

Bronchoscopy

- NPO
- Assure informed consent signed
- Anxiety reduction
- IV access
- Hydration
- Pre-op sedation
- Post-op care
  - Oxygen
  - Side-lying position
  - Re-orientation
  - Anxiety reduction
  - Evaluate for gag reflex

TABLE 26-8 NORMAL PHYSICAL ASSESSMENT OF THE RESPIRATORY SYSTEM

<table>
<thead>
<tr>
<th>Table 26-8: Normal Physical Assessment of the Respiratory System</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nose</strong></td>
</tr>
<tr>
<td>Symmetric with no deformities</td>
</tr>
<tr>
<td>Nasal mucosa pink, moist with no edema, exudate, blood, or polyps</td>
</tr>
<tr>
<td>Nasal septum straight; nares patent bilaterally</td>
</tr>
<tr>
<td><strong>Oral mucosa</strong></td>
</tr>
<tr>
<td>Light pink, moist, with no exudate or ulcerations</td>
</tr>
<tr>
<td><strong>Pharynx</strong></td>
</tr>
<tr>
<td>Smooth, moist, and pink</td>
</tr>
<tr>
<td><strong>Trachea midline</strong></td>
</tr>
<tr>
<td><strong>Chest</strong></td>
</tr>
<tr>
<td>Anterior-posterior (AP) to lateral diameter 1:2</td>
</tr>
<tr>
<td>Respiration normal at 14/min</td>
</tr>
<tr>
<td>Breath sounds vesicular without crackles, rhonchi, or wheezes</td>
</tr>
<tr>
<td>Excursion equal bilaterally with no increase in tactile fremitus</td>
</tr>
</tbody>
</table>
**Lung Biopsy**

- Performed during bronchoscopy
- Data on tumors or subcarinal lymph nodes
- Risks
  - Bleeding
  - Pneumothorax
  - Infection
  - Aspiration

**Diagnostic Studies: Thoracentesis**

- Insertion of needle
- Fluoroscopic guidance
- Pleural space
- Withdrawal of fluid
- Diagnostic
- Palliative

**Functional Diagnostic Studies**

- Pulmonary Function Tests
- Exercise Testing
  - Indications
  - Role of nurse