Chapter 15: Measuring Height, Weight, and Vital Signs
Height and Weight

• Weight
  – Baseline measurement at patient’s first visit
  – Measured in kg or lbs
  – Common types of scales
    • Balance beam
    • Dial
    • Digital
Height and Weight (cont’d)

- Weight
  - The three types of scales—balance beam, dial, & digital
Height and Weight (cont’d)

• Patients Required to Have Weight Measured
  – Pregnant patients
  – Infants
  – Children
  – Older adults
  – Patients prescribed medication based on body weight
  – Those attempting to lose or gain weight
  – Those with certain conditions
Height and Weight (cont’d)

• Height
  – Measured by
    • Movable ruler on back of most balance beam scales
    • Rule mounted on wall
  – Parallel bar on ruler is moved down against patient’s head
  – Measured in inches or cm
Temperature

- **Overview**
  - Balance between heat produced & heat lost by body
  - **Core temperature:** relatively constant internal temperature of body
    - **Normal (afebrile) range:** 97°F to 99°F (36.1°C to 37.2°C)
    - **Febrile:** >99°F (37.2°C) or feverish
    - **Hypothermic:** <95°F (35°C)
Temperature (cont’d)

• Neural Control of Body Temperature
  – **Hypothalamus**: part of brain that regulates body temperature
  – If body too cool, brain signals to conserve & generate heat
  – If body too warm, brain signals to carry heat away from core to surface
Temperature (cont’d)

- **Factors Influencing Body Temperature**
  - **Age:** higher in children than adults; lower in older adults
  - **Gender:** slightly higher in women
  - **Exercise:** increases temperature
  - **Time of day:** lowest in early morning, before activity
  - **Emotions:** rises with stress, falls with depression
  - **Illness:** can increase or lower
Temperature (cont’d)

• Sites for Measuring Temperature
  – Mouth
  – Rectum (most accurate)
  – **Axillary:** ear or temple (best for children)
# Temperature Comparisons

<table>
<thead>
<tr>
<th>Method</th>
<th>Fahrenheit</th>
<th>Centigrade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>97.6-99.6</td>
<td>36.5-37.5</td>
</tr>
<tr>
<td>Rectal</td>
<td>98.6-100.6</td>
<td>37.0-38.1</td>
</tr>
<tr>
<td>Axillary</td>
<td>96.6-98.6</td>
<td>35.8-37.0</td>
</tr>
<tr>
<td>Tympanic</td>
<td>98.2-100.2</td>
<td>36.8-37.9</td>
</tr>
</tbody>
</table>
Temperature (cont’d)

• Types of Thermometers
  – Electronic
  – Tympanic (ear)
  – Temporal (forehead)
  – Disposable
Temperature (cont’d)

- Electronic thermometers and probes
Temperature (cont’d)

- Tympanic thermometer
Temperature (cont’d)

- Disposable thermometer
Temperature (cont’d)

- Temporal artery thermometer
Pulse

Overview

- Expansion & relaxation of arteries with heart beat
- Allows measurement of heart rate
- Indicates flow of blood to a particular area
Pulse (cont’d)

- **Factors Influencing Pulse**
  - **Age**: greater in infants, children, & some older adults
  - **Fitness**: lower in conditioned athletes
  - **Time of day**: lower in early morning, higher later in day
  - **Body type & size**: lower in tall, thin people; higher in short, stocky people
  - **Stress or emotion**: higher in anger, fear, excitement, & stress; lower in depression
  - **Fever**: higher
  - **Medications**: higher or lower
  - **Blood volume**: higher with decreased blood volume
Pulse (cont’d)

• Pulse Sites
  – Carotid artery (neck)
  – Brachial artery (bend of elbow)
  – Radial artery (wrist)
  – Femoral artery (thigh/torso)
  – Popliteal artery (back of knee)
  – Posterior tibial artery (ankle)
  – Dorsalis pedis (top of foot)
  – Apical (over heart)
Pulse (cont’d)

• Carotid pulse point

A Carotid
Pulse (cont’d)

• Brachial pulse point
Pulse (cont’d)

- Radial pulse point
Pulse (cont’d)

- Femoral pulse point
Pulse (cont’d)

- Popliteal pulse point
Pulse (cont’d)

• Dorsalis pedis pulse point
Pulse (cont’d)

- Posterior tibial pulse point
Pulse (cont’d)

- Pulse Characteristics
  - **Pulse rate**
    - # of heartbeats in 1 min
    - **Average:** 60 to 100 bpm
    - **Bradycardia:** <60 bpm
    - **Tachycardia:** >100 bpm
  - **Pulse rhythm**
    - Pattern of heartbeats
    - **Arrhythmia:** abnormal heart rhythm
  - **Pulse strength:** soft, bounding, weak, thready, strong, or full
Pulse (cont’d)

• Taking a Pulse Manually
  – Place fingers over pulse point
    • Index & middle
    • Middle & ring
    • Index, middle, & ring
  – Radial artery (on inside of wrist) is most common site
  – Count heartbeats for 30 seconds (& multiply by 2) or for 1 min
Pulse (cont’d)

• Using a Stethoscope
  – Auscultate: to hear a pulse
  – Place stethoscope over patient’s heart
  – Doppler ultrasound stethoscope
    • Amplifies sound of pulse
    • Used when pulse is difficult to palpate or hear
Pulse (cont’d)

• The stethoscope
Pulse (cont’d)

- Doppler ultrasound stethoscope
Respiration

Overview

- Exchange of gases between atmosphere & blood in body
- Carbon dioxide is expelled
- Oxygen is taken in
- Respiration = 1 inhalation + 1 exhalation
Respiration (cont’d)

• Inhale (breathe in)
  - Air flows into lungs
  - Diaphragm contracts & flattens
  - Rib cage rises & expands

• Exhale (breath out)
  - Air flows out of lungs
  - Diaphragm relaxes, becomes dome-like
  - Rib cage contracts
Respiration (cont’d)

• Characteristics of Respiration
  – Rate
    • # of respirations per min
    • Normal (adults): 12 to 20 times per min
    • Eupnea: normal respiration
  – Rhythm: pattern of spacing between breaths
  – Depth: volume of air inhaled & exhaled
# Average Normal Resting Respiration Ranges by Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Respiration per Minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant</td>
<td>20+</td>
</tr>
<tr>
<td>Child</td>
<td>18-20</td>
</tr>
<tr>
<td>Adult</td>
<td>12-20</td>
</tr>
</tbody>
</table>
Respiration (cont’d)

• Factors Influencing Respiration
  – Physical condition
  – Disease
  – Medication
  – Exercise
  – Pain
  – Emotions
Respiration (cont’d)

- **Tachypnea**: fast respiratory rate
- **Bradypnea**: slow respiratory rate
- **Dyspnea**: difficult or labored breathing
- **Orthopnea**: condition in which breathing is easier in an upright position
- **Apnea**: temporary cessation of breathing
Blood Pressure

Overview

- Pressure of blood against arterial walls
- Measured during contraction & relaxation phases of heartbeat
- **Systolic pressure:** highest pressure in arteries in contraction
- **Diastolic pressure:** lower pressure when heart relaxes
- Measured using a stethoscope & sphygmomanometer
- Measured in milliliters of mercury (mm Hg)
- Written as systolic/diastolic
- **Normal:** <120/80 mm Hg
Blood Pressure (cont’d)

- Factors Affecting Blood Pressure
  - Age
  - Activity
  - Stress
  - Body position
  - Medications
Blood Pressure (cont’d)

• Blood Pressure Conditions
  – **Hypertension**: persistently above-normal blood pressure
  – **Hypotension**: persistently below-normal blood pressure
  – **Orthostatic hypotension**: low blood pressure & fainting on rising to a standing position
# Blood Pressure Readings

<table>
<thead>
<tr>
<th></th>
<th>Systolic BP (mm Hg)</th>
<th>Diastolic BP (mm Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;120</td>
<td>&amp;</td>
</tr>
<tr>
<td>Prehypertension</td>
<td>120-139</td>
<td>or</td>
</tr>
<tr>
<td>Hypertension, stage I</td>
<td>140-159</td>
<td>or</td>
</tr>
<tr>
<td>Hypertension, stage II</td>
<td>≥160</td>
<td>or</td>
</tr>
</tbody>
</table>

- Normal: Systolic BP <120 mm Hg and Diastolic BP <80 mm Hg
- Prehypertension: Systolic BP 120-139 mm Hg or Diastolic BP 80-89 mm Hg
- Hypertension, stage I: Systolic BP 140-159 mm Hg or Diastolic BP 90-99 mm Hg
- Hypertension, stage II: Systolic BP ≥160 mm Hg or Diastolic BP ≥100 mm Hg
Blood Pressure (cont’d)

• Preventing Orthostatic Hypotension
  – Help patient raise head off table
  – Help patient sit up on side of bed
  – Watch for dizziness
  – Help patient into standing position
Blood Pressure (cont’d)

- Blood Pressure Equipment
  - Aneroid sphygmomanometer
  - Electronic sphygmomanometer
  - Doppler ultrasound stethoscope
Blood Pressure (cont’d)

• Measuring Blood Pressure
  – Wrap cuff around upper arm
  – Place stethoscope on inside of elbow
  – Squeeze hand pump to inflate cuff (artery is squeezed shut)
  – Turn screw valve slowly counterclockwise, releasing air
  – Listen through stethoscope as blood flows through vessel
Blood Pressure (cont’d)

- Conditions Contraindicating Blood Pressure Reading in an Arm
  - Intravenous (IV) line
  - Dialysis shunts
  - Major cuts or wounds
Blood Pressure (cont’d)

• Charting Vital Signs
  – Provides picture of patient’s health over years
  – Helps identify development of chronic health conditions
  – Recorded using either flow sheets or narrative charting
  – If flow chart is electronic, data can be converted to chart or graphic