Measuring Vital Signs

• Taking a patient’s vital signs (also called cardinal signs) is an important part of a physical assessment and includes:
  - Body temperature
  - Pulse
  - Respiration
  - Blood Pressure
Vital Signs in the Imaging Department

- When the patient’s general condition changes or if the patient reports nonspecific symptoms, as simple as not feeling well.
- RN not available
- Prior to an invasive procedure
- Before and after administration of meds.
Body Temperature

- Body temperature is the physiologic balance between heat produced in body tissue and heat loss to the environment.

- It is controlled by a small structure in the basal region of the brain called the “Hypothalamus.”

- Changes in the body’s physiology occur when the body temperature fluctuates 2-3 degrees.
Factors that Can Cause a Change in Body Temperature

- The environment
- Time of day
- Age
- Weight
- Hormone levels
- Physical activity
- Disease
- Injury
Normal Body Temperature

- Adult (14 and over): 97.8 to 98.6 F
- Child (4 to 13): 97.8 to 98.6 F
- Infant (3 months to 3 yrs): 99.0 to 99.7 F
A patient whose body temperature is elevated above normal limits is said to have a “fever” also known as “Pyrexia.”

Fever indicates a disturbance in the heat regulating centers of the body, usually due to disease process. As the body temperature increases, the body demands for oxygen increase.
• If a person’s body temperature is below normal limits, they are said to have “Hypothermia.”

• Hypothermia may be induced medically to reduce a patient’s need for oxygen.

• A person can die with temperatures above 105.8 to 111.2 degrees or below 93.2 degrees.
Measuring Body Temperature

- 4 areas of the body to measure temperature
  - Mouth (oral) under tongue: 98.6
  - Ear (tympanic): 97.6
  - Rectum (anal opening): 99.6
  - Armpit (axillary): 97.6 to 98
The Tympanic Membrane Thermometer

- Also called the “Aural” thermometer

- Small hand held devise that places the probe close to the tympanic membrane that provides a reading close to the core body temperature.
The Electronic and Glass Thermometer for Oral Temperature

- This method is the same as the aural except that the probe is longer and is placed in the mouth under the tongue and held in place until a digital reading is produced.

- The glass thermometer should not be used if the patient is apt to be injured during the procedure by biting down or if the patient is unable to keep the mouth and lips closed for 3 – 5 min.
Axillary Temperature

- The use of the axillary site is the safest method because it is non-invasive.
- An electronic or glass thermometer may be used.
- Time and precision placement are needed to obtain an accurate reading.
Rectal Temperature

- This site is considered to provide the most reliable measurement of body temperature.
- It is also in close proximity to the pelvic region or “core” temperature of the body.
- This method should not be used if the patient is restless or has rectal bleeding or hemorrhoids.
- Use the thermometer with a blunt tip.
Pulse

- As the heart beats, blood is pumped into the arteries. This results in a throb or pulsating of the artery that is felt by superficial skin.

- At the areas of the body in which arteries are superficial, the pulse can be felt by holding the artery beneath the skin against a solid surface such as bone.
9 Locations to Measure a Pulse

- **Apical**: can be heard with a stethoscope
- **Radial**: at the wrist at the base of the thumb.
- **Carotid**: Neck
- **Femoral**: Groin
- **Popliteal**: Post. knee
- **Temporal**: Front of ear
- **Dorsalis Pedis**: Top of foot
- **Post. Tibial**: Inner side of ankle
- **Brachial**: Groove of elbow
Average Pulse Rates

- Adult: 60-90 BPM
- Child: 90-100 BPM
- Infant: 120 BPM
Assessment of Pulse

- The pulse rate is a rapid and relatively efficient means of assessing cardiovascular function.
- **Tachycardia**: is an abnormally rapid heart rate (over 100 bpm).
- **Bradycardia**: is an abnormally slow heart rate (below 60 bpm).
- The radial pulse is usually the most accessible and can be taken most conveniently on an adult.
• When taking a pulse, be careful not to press too hard with fingers.

• Do not use the thumb to count the pulse because it has its own pulse.

• Have a watch with second hand to count for 1 full minute.
Respiration

- The function of the respiratory system is to exchange oxygen and carbon dioxide between the external environment and the blood circulating in the body.

- Oxygen is taken into the lungs during inspiration. It passes through the bronchi, into the bronchioles, and then into alveoli, which are the gas-exchange units of the lungs.

- Oxygen is transported to the body tissues by the arterial blood.
Respiration - Average Baselines

- Adult: 15 – 20 breaths/min

- Child (1 – 10 yrs): 20 – 30 bpm

- Infant (under 1 year): 30 – 60 bpm

- Respirations should be quiet, effortless and uniform
Assessment of Respiration

- The patient is in present position
- Observe the chest wall for symmetry of movement
- Observe skin color – Cyanosis.
- Count the number of times the patient’s chest rises and falls one full minute.
- The patient should not be aware that respirations are being counted and alter their normal pattern of breathing.
Respirations of Fewer than 10 breaths per minute

- Cyanosis
- Apprehension
- Restlessness
- Change in level of consciousness, because the supply of oxygen is inadequate to meet the needs of the body.
- Dyspnea = When a patient is using more than the normal effort to breathe.
Blood Pressure

- It is the amount of resistance the blood flow ejected from the left ventricle of the heart during systole and the amount of resistance of the blood meets due to systemic vascular resistance.

- The number of red blood cells in the blood plasma determines the viscosity of the blood. With an increased number, the blood thickens or becomes more viscous and subsequently increases the blood pressure.
Maintenance of Blood Pressure Depends On:

- Peripheral resistance
- Pumping action of the heart
- Blood volume
- Blood viscosity
- Elasticity of the vessel wall
Other Factors that Change the Blood Pressure

- Age
- Weight
- Temperature
- Disease
- Exercise
- Stress!!!!!!!
Normal BP Range

• **Adult**
  110-140 : systolic
  60-80 : diastolic

  **Child**
  90-120 : systolic
  50-70 : diastolic

  **Adolescent**
  85-130 : systolic
  45-85 : diastolic
Baseline Blood Pressure

- Hypertensive
  - Systolic blood pressure is consistently over 140
  - Diastolic blood pressure is consistently over 90

- Hypotensive
  - Systolic blood pressure is less than 90
Blood Pressure Equipment

- Sphygmomanometer = blood pressure cuff
  - 2 types of sphygmomanometers:
    - Mercury manometer (most accurate)
    - Aneroid manometer
- Stethoscope = Instrument used to listen
- BP cuff should be selected according to patient size.
Stethoscope

- Bladder
- Bell
- Plastic or rubber tubing
- Ear pieces
Reading Blood Pressure

• 1\textsuperscript{st} number = Systolic pressure
  - The highest point reached during contraction of the left ventricle of the heart as it pumps blood into the aorta.

2\textsuperscript{nd} number = Diastolic pressure
  - The lowest point to which the pressure drops during relaxation of the ventricles.
Measuring BP

- Patient should be sitting upright with arm reclined and supported.
- Sleeves should be rolled up/no tight clothing around the arm.
- Room should be quiet to facilitate hearing the pulse.
- The bladder, bell, and ear pieces should be cleansed with alcohol before and after each use.
Oxygen Administration

- An adequate oxygen supply is essential to life, and when a human being’s oxygen supply is suddenly interrupted or interfered with, it is an emergency that needs immediate attention.

- It is your responsibility to insure that the room you are assigned to has a full supply of oxygen and delivery method.

- The overall goal of oxygen therapy is to maintain adequate tissue oxygenation while minimizing cardiopulmonary work.

- Hypoxemia = When the level of oxygen in the arterial blood becomes inadequate to meet the patient’s physiological needs.
Pulse Oximetry

- Used to monitor the oxygen saturation in the hemoglobin. This is a fast noninvasive method of monitoring the patient for sudden changes in oxygen saturation.

- Normal SaO2 values are 95-100%

- Values of less than 85% indicates that tissues are not receiving adequate oxygen.
Hazard of Oxygen Administration

- Oxygen is considered to be a medication, and like all other forms of therapy, it must be prescribed by a physician.
- Severe oxygen toxicity may cause irreversible damage.
- Chronic Obstructive Pulmonary Disease (COPD) = Excessive amounts of oxygen to patient’s who have COPD may depress the respiratory drive, and the patient may stop breathing.
Cont.

- Infection and bacteria thrive on oxygenated environments; therefore, the equipment used for oxygen must be replaced after each use.

- Oxygen is combustible, so take great care to prevent sparks from being near electrical equipment. Smoking is prohibited in rooms where oxygen is in use and patients should not be around oxygen.

- High flow rates of oxygen are toxic to patients who have COPD because their respiration is controlled by higher levels of carbon dioxide in the blood.
Oxygen Delivery Systems

- Nasal Cannula
- Nasal Catheter
- Face mask
Other Systems

- Transtracheal
- Mechanical ventilators (respirators)
- Oxygen tent
- Home oxygen delivery system
- Oxygen delivery equipment for the imaging department