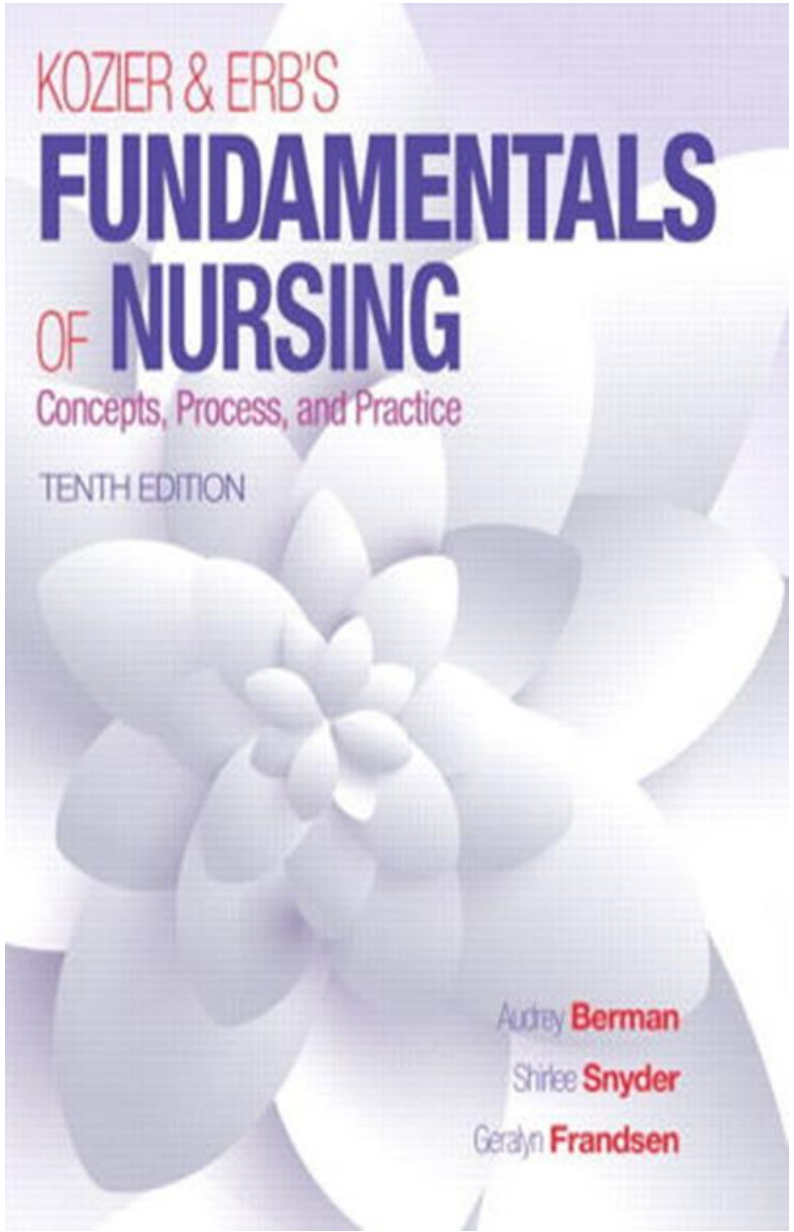
Unit 3
Vital Signs

- Body temperature.
- Pulse.
- Respiration.
- Blood pressure.



Basic Nursing Skills
Vital /cardinal signs(VS)

VS are measurement reflect function of three body processes that are essential for life.

1.Regulation of body temperature

2.Heart function

3.Breathing

Abbreviations:

1-T Temperature

2-R Respirations

3-P Pulse

4-BP Blood Pressure

Times to Assess Vital Signs

1. On admission to a health care agency
2. When a client has a change in health status
3. According to a nursing or medical order.
4. Pre-post operation or an invasive procedure.
5. Before / after the administration of a medication affect respiratory or cardiovascular system (e.g., Digixin).
6. Before / after any nursing intervention affect the vital signs (e.g. ambulating the client who has been on bed rest)

1. Body Temperature

- It reflects the balance between the heat produced by body and heat lost from the body.

Heat production by muscles, glands and oxidation of food

Heat loss by respiration, perspiration (sweat), excretion (elimination)

Heat Balance is when the amount of heat produced the body exactly equals the amount of heat loss.

Factors Affecting Temperature

- Exercise
- Illness
- Age
- Time of day
- Medications
- Infection
- Emotions
- Hydration
- Clothing
- Environmental temperature/air movement

Kinds of Body Temperature:

1- Core temperature

- Temp of deep tissues of the body, such as cranium, thorax, abdominal cavity, and pelvic cavity.
- The normal core temperature is a range between 36.7 C (98F) and 37 C (98.6F).

2- Surface temperature:

- Temp of skin, subcutaneous tissue, and fat.
- It rises and falls in response to the environment.
- It can vary from 20 C to 40 C.

Alterations in Body Temperature

I. Pyrexia , hyperthermia, or fever :

- A body temperature above the usual range is
- A very high fever, 41C, is hyperpyrexia.
- **Febrile: is** client who has a fever
- **Afebrile is** client who does not have fever

Types of Fever

-Intermittent:

Body temperature alternates at regular intervals between periods of fever and periods of normal or subnormal temperature.

-Remittent:

A wide range of temperature fluctuations (more than 2C) occurs over the 24-hour period, all of which are above normal.

-Relapsing

Short febrile periods of a few days are interspersed with periods of 1 or 2 days of normal temperature.

-Constant:

Body temperature fluctuates minimally but always remains above normal.

Clinical Signs of Fever

1) Onset (cold or chill stage)

- Increased heart rate, temperature, erespiratory rate and depth
- Shivering
- Pallid, cold skin
- Complaints of feeling cold
- Cyanotic nail beds
- Gooseflesh appearance of the skin
- Cessation of sweating

Clinical Signs of Fever

2) Course stage

- Absence of chills
- Skin that feels warm
- Feelings of being neither hot nor cold
- Photosensitivity
- Increased pulse, respiratory rates and thirst
- Mild to severe dehydration
- Drowsiness, restlessness, or delirium, and convulsions
- Herpetic lesions of the mouth
- Loss of appetite
- Malaise, weakness, and aching muscle

Clinical Signs of Fever

3) Defervescence (Fever abatement) stage

- Skin that appears flushed and feels warm
- Sweating
- Decreased shivering
- Possible dehydration

Alterations in Body Temperature

II- Hypothermia

- It is a core body temp below lower limit of normal.
- Physiologic mechanisms of hypothermia are:

a) Excessive heat loss,

b) Inadequate heat production to counteract heat loss,

c) Impaired hypothalamic regulation.

Clinical Signs of Hypothermia

- Decreases body temp, pulse, respirations Blood pressure
- Severe shivering (initially) feelings of cold& chills.
- Pale, cool, waxy skin.
- Decreased urinary output.
- Lack of muscle coordination.
- Disorientation.
- Drowsiness progressing to coma

Sites for Measuring Body Temperature

1- Oral.

- It reflects changing body temperature quickly
- It is the most accessible and convenient method.
- If a client has been taking cold or hot food or fluids or smoking, the nurse should wait 30 minutes before taking the temperature.
- Time for leaving thermometer in the mouth is 2-3 minutes.

2- Rectal.

- It is the most accurate and reliable measurement.
- The time for leaving thermometer in rectum is 3-5 minutes
- Recently it is **forbidden** in children

Sites for Measuring Body Temperature

3- Axilla.

It is the safest, most non-invasive measurement.

The time for leaving thermometer under axilla is 5-9 minutes (5 minutes for infants and children)

4-Tympanic membrane, or nearby tissue in the ear canal.

5- Skin: overhead 1-3 second

Types of Thermometers

1- Mercury-in-glass thermometers.

2- Electronic thermometers.

read in 2- 60 seconds

3- Skin thermometers; applied to forehead

4- Temperature-sensitive tape. It may be used to obtain a general indication of body surface temperature. The tape contains liquid crystals that change color according to temperature.

5- Infrared thermometers. الأشعة تحت الحمراء

It senses body heat in form of infrared energy given off by a heat source

Temperature Scales

1. Celsius (centigrade)
2. Fahrenheit.

- To convert from F to C= (Fahrenheit temperature - 32) X 5/9

Fahrenheit reading is 100 C = (100-32) X 5/9

=68 X 5/9 = 37.7

- To convert from C to F = (Celsius temperature x 9/5)+32

Celsius reading is 40.0 F = (40 X 9/5) +32 =72+32 =104

2. Pulse

- **Pulse** is a wave of blood created by contraction of the left ventricle of heart
- Pulse rate same as rate of ventricular contractions of the heart.
- Pulse is pressure of blood pushing against wall of artery as heart beats and rests
- Pulse easier to locate in arteries close to skin that can be pressed against bone

Pulse

1. Peripheral pulse:

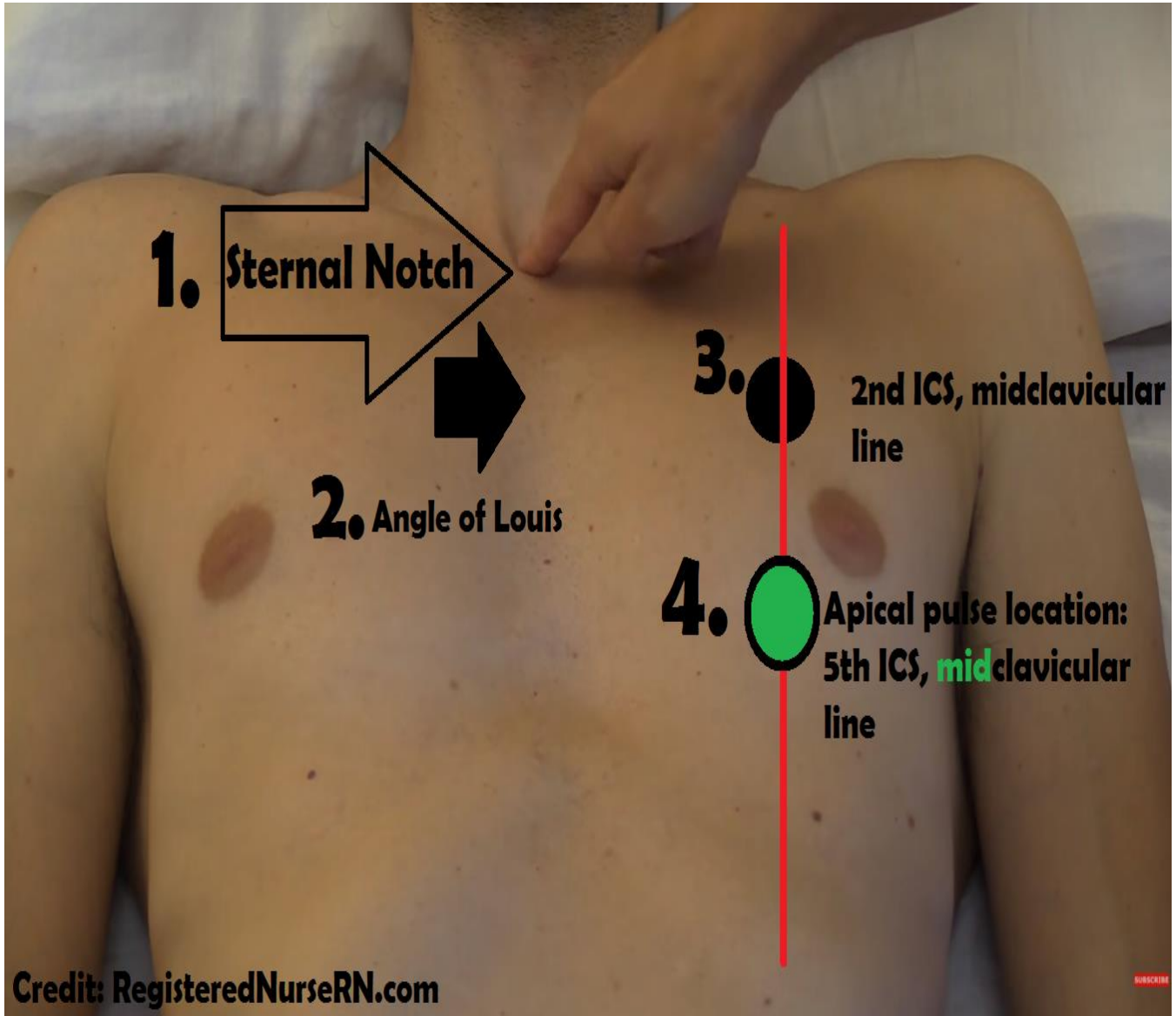
Is the pulse located in periphery of body, for example, in foot, hand, or neck.

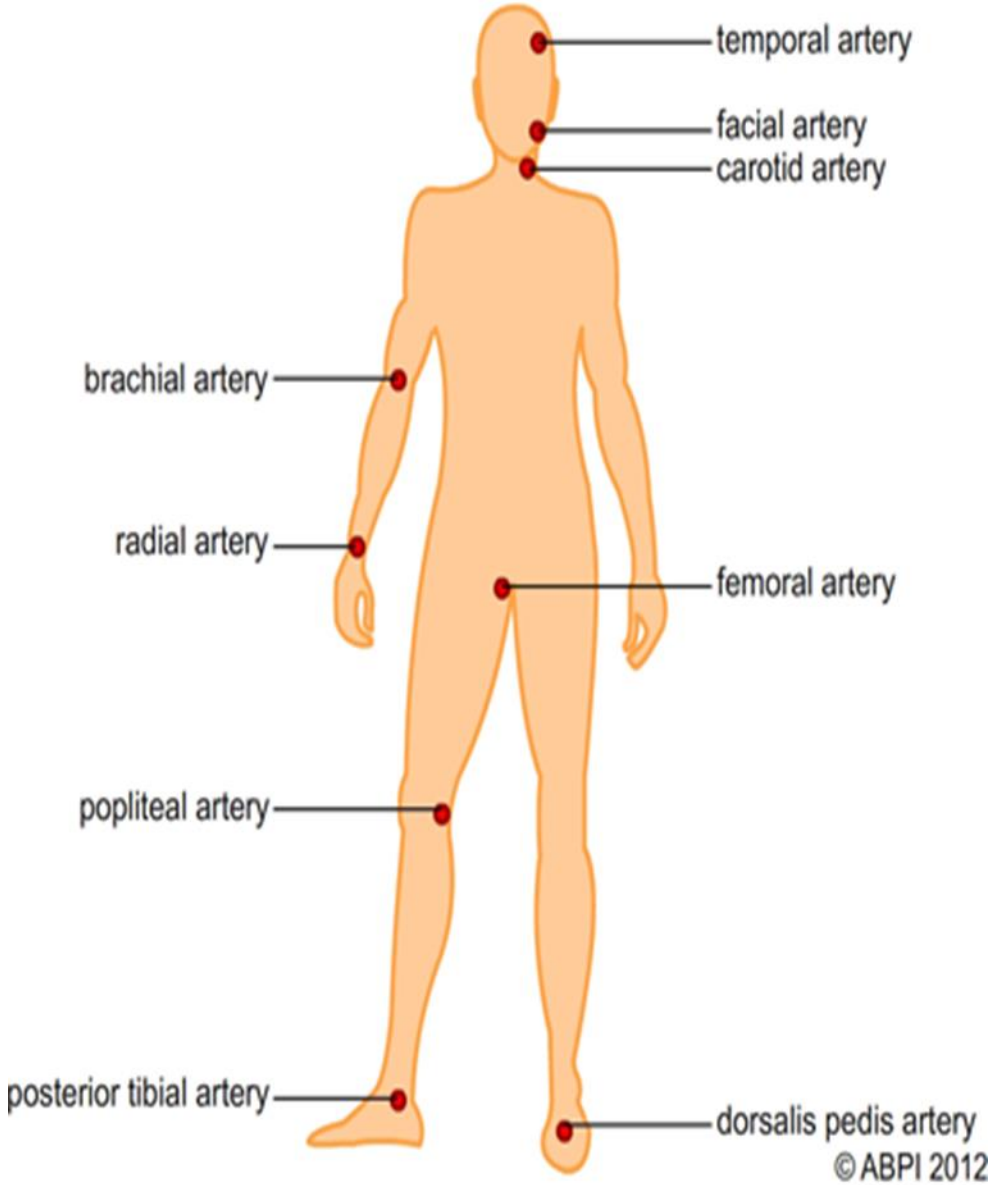
2. Apical pulse

Is a central pulse; it is located at apex of heart.

Apex of heart is located on left of sternum and under the 4th, 5th, or 6th intercostals space.

Pulse


1. Sternal Notch
2. Angle of Louis
3. 2nd ICS, midclavicular line
4. Apical pulse location: 5th ICS, midclavicular line
Credit: RegisteredNurseRN.com


temporal artery
facial artery
carotid artery
brachial artery
radial artery
femoral artery
popliteal artery
posterior tibial artery
dorsalis pedis artery
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Factors affecting Pulse Rate

- **Age.** As age increases, pulse rate decreases.
- **Gender**. average male's pulse rate is slightly lower than female's.
- **Exercise**. increase pulse rate
- **Fever**. increase pulse rate
- **Medication**. Some medications decrease pulse rate, and others increase it
- **Hemorrhage**. increases pulse rate, but become weak.
- **Stress**. increases pulse rate
- **Position Changes.** increases pulse rate

Sites For Taking Pulse

- Radial: base of thumb most common site
- Temporal: side of forehead
- Carotid : side of neck
- Brachial : inner aspect of elbow
- Femoral: inner aspect of upper thigh
- Popliteal - behind knee
- Dorsalis pedis – top of foot
- Apical pulse – over apex of heart, taken with stethoscope, left side of chest

Assessing Pulse

- A pulse assessed by palpation (feeling) and auscultation (hearing).
- The middle three fingertips are used for palpating all pulse sites except the apex of heart.
- Auscultation method is used to assess apical pulse, by stethoscope
- A pulse is normally palpated by apply moderate pressure with the three middle fingers of the hand.
- The pads on the most distal aspects of the fingers are the most sensitive areas for detecting a pulse.
- Thumb is not used in palpating a pulse because the nurse might feel her/his own thumb pulse.
- Before the nurse assesses pulse, put client in a comfortable position

Peripheral Pulse Assessment :

Usually radial pulse, is assessed by palpation in all individuals **except**:

1. Newborns and children up to 2 or 3years .
2. Very obese or elderly clients
3. Individuals with a heart disease (apical pulse)
4. Individuals in whom circulation to a specific body part must be assessed, e.g. following leg surgery, pedal is assessed.

Characteristics of Pulse

1) Rate:

The normal range of pulse is between 60-100 beat/minute.

Tachycardia is excessively fast heart rate (over 100 beats/ minute in an adult).

Bradycardia is heart rate is less than 60/minute in an adult.

If a client has tachycardia or bradycardia, the apical pulse should be assessed.

Characteristics of Pulse

2) Pulse rhythm:

- Is pattern of the beats and intervals between beats.
- Time should be equal between beats.
- A pulse with irregular rhythm is referred to as dysrhythmia or arrhythmia.
- When a dysrhythmia is detected, apical pulse should be assessed.

Characteristics of Pulse

3) Pulse volume(amplitudeالسعة): force of blood with each beat.

- It can range from absent to bounding محدود.
- A normal pulse can be felt with moderate pressure of fingers and can be obliterated with greater pressure.
- Bounding pulse: a strong throbbing blood volume that is obliterated only with difficulty
- Weak, feeble, or thread pulse obliterated with pressure from the fingers الخيط.
- Pulse volume is the same each beat.

Respirations

Respiration: process of taking in oxygen and expelling carbon dioxide from lungs and respiratory tract .

It includes external and internal respiration.

External respiration is interchange of oxygen (O2) and carbon dioxide (CO2) between alveoli of lungs and pulmonary blood.

Internal respiration it is interchange of the same gases between the circulating blood and the cells of the body tissues.

Respiration

- **Inhalation (Inspiration)** is intake of air into lungs.
- **Exhalation (Expiration)** is breathing out or the movements of gases from the lungs to atmosphere.
- **Ventilation** is movement of air in and out of the lungs.

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Types of Breathing

Costal (thoracic) breathing.

- It involves external intercostals muscles and other accessory muscles, such as the sternocleidomastoid muscles.
- It can be observed by movement of chest upward and outward.

Diaphragmatic (abdominal).

- It occurs as a result of contraction and relaxation of the diaphragm.
- It is observed by the movement of the abdomen.

Respiration is Regulated by:

a) Respiratory centers in medulla oblingata and the pons of the brain and

b) Chemoreceptors located centrally in the medulla and periphery in the carotid and aortic bodies.

These centers and receptors respond to changes in concentrations of oxygen, carbon dioxide and hydrogen in the arterial blood.

Factors Affecting Respiratory Rate

- **Exercise**: increases respiratory rate.
- **Stress:** increases respiratory rate.
- **Environment**: increased temperature increases respiratory rate
- **Increased altitude**: It lowers oxygen concentration, it increases respiratory rate.
- **Certain medications e.g narcotic, analgesic**. decreases respiratory rate.

Breathing Patterns

1)Rate.

It is normally described in breaths/ minute.

- **Eupnea**: normal respiration rate and depth
- **Bradypnea** abnormally slow respirations
- **Tachypnea** or **polypnea** :abnormally fast respirations
- **Apnea** is absence or cessation of breathing.

Breathing Patterns

2) Depth.

- It established by watching the movement of the chest.
- It generally described as normal, deep, or shallow.

➢ Deep resp: a large volume of air is inhaled or exhaled, inflating most of the lungs.

➢ Shallow resp involve exchange of a small volume of air and often the minimal use of lung tissue.

- **Tidal Volume:** during a normal inspiration and expiration, an adult takes in about 500 ml of air

Breathing Patterns

3) Volume

Hyperventilation:

Refers to an increase in amount of air in lungs, characterized by prolonged, rapid and deep breathing; may be associated with anxiety.

Hypoventilation

Refers to a reduction in amount of air in lungs; characterized by shallow respirations.

Breathing Patterns

Rhythm or Pattern.

- It refers to time between one breath to next one.
- It is regularity of expirations and inspirations.
- Respiratory rhythm can be described as regular or irregular.

Breathing Patterns

Respiratory Quality or Character (Ease or effort)

- It refers to abnormal breathing
- Usually, breathing does not require noticeable effort

The abnormalities are:

Dyspnea:

- Refers to difficult and labored breathing, and the individual has persistent, unsatisfied need for air and feels distressed.

Orthopnea

- Refers to ability to breath only in upright sitting or standing positions.

Sound of Breathing.

Normal breathing is silent

Abnormal breath sounds that are audible without amplification are:

1-Stridor is a shrill, harsh sound heard during inspiration with laryngeal obstruction.

2-Stertor is snoring respiration, usually due to partial obstruction of the upper airway.

3-Wheeze is continuous, high pitched musical squeak or whistling sound occurring on expiration and sometimes on inspiration when air moves through a narrowed or partially obstructed airway.

4-Bubbling is gurgling sounds heard as air passes through moist secretions in the respiratory tract.

Sound of Breathing.

Abnormal breath sounds that are audible by stethoscope are:

- **Crackles (rales)** are dry or wet crackling sounds stimulated by rolling a lock of hair near the ear. Generally hard on inspiration as air moves through accumulated moist secretions.
- **Gurgles (rhonchi)** is coarse, dry, wheezy, or whistling sound more audible during expiration as the air moves through tenacious mucus or narrowed bronchi.
- **Pleural friction rub** is coarse, leathery, or grating sound produced by the rubbing together of inflamed pleura.

Secretions and Coughing

Hemoptysis:

- Is the presence of blood in sputum.

Reproductive cough

- Is cough accompanied by expectorated secretions.

Non- productive cough

- Is a dry, harsh cough with secretions.

Blood Pressure (B.P)

Arterial blood pressure

- Blood pressure is the force of blood pushing against walls of arteries
- Blood pressure measured in millimeters of mercury (mm H g) and recorded as a fraction.
- Systolic pressure انقباضيis written over the diastolic pressureالانبساطي
- Average blood pressure of a healthy adult is 120/80

Systolic Pressure

Is the pressure of the blood as a result of contraction of the ventricles, pressure of the height of the blood wave.

Diastolic Pressure

Is the pressure when ventricles are at rest. It is the pressure present at all times within the arteries.

Pulse Pressure

Is the difference between diastolic and systolic pressure.

Factors affecting Blood Pressure (B.P)

There are many factors affecting may decrease or increase Bp.

- **Age.** Blood pressure rises with age,.
- **Exercise**. Physical activity increases the blood pressure.
- **Stress**: increasing blood pressure
- **Race**. African males over 35 years have higher BP
- **Obesity**. BP is higher in obese people
- **Gender** females have lower blood pressure. After menopause, women generally have higher blood pressure
- **Medications:** may decrease or increase Bp
- **Daytime Variation.** Bp is lower in the morning, then rises throughout the day and peaks in the late afternoon or early evening.
- **Disease Process**.

Assessing Blood Pressure

- BP measured with BP cuff, a sphyg-mo-manometer, and a stethoscope.
- BP cuff consists of a rubber bag that can be inflated with air. It is called the bladder.
- It covered with cloth and has two tubes attached to it. One tube connects to a rubber bulb that inflates the bladder and the other tube is attached on a sphygmomanometer.
- Bp usually assessed using brachial artery in the client's arm
- Assessing the blood pressure on a client's thigh is indicated if the blood pressure can't be measured on either arm

Assessing Blood Pressure

Bp is not measured on a client's arm or thigh if :

1) Shoulder, arm, or hand (or the hip, knee, or ankle) is injured or diseased,

2) there is a cast or bandage on any part of the limb,

3) client has had breast or axilla (or hip) surgery

4) client has an intravenous infusion or a blood transfusion running,

5) client has an arteriovenous fistula for renal dialysis.

Types of Sphygmomanometer

- Mercury sphygmomanometer is a calibrated cylinder filled with mercury
- Aneroid sphygmomanometer is a calibrated dial with a needle that points to the calibrations
- Electronic sphygmomanometers,

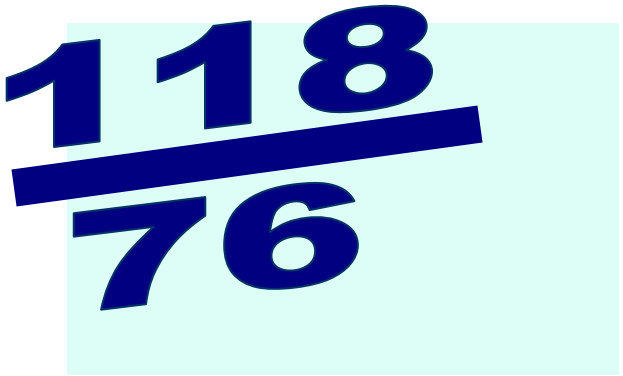
Methods assessing Blood pressure

1- Direct (invasive monitoring) measurement involves insertion of a catheter into the brachial, radial, or femoral artery. this pressure reading is highly accurate.

2- Indirect methods of measuring blood pressure using sphygmomanometer

Measuring Blood Pressure

- Normal blood pressure range
  - Systolic: 90-140 millimeters of mercury
  - Diastolic: 60-90 millimeters of mercury



The conditions are reflected by changes in blood pressure are:

I- Hypertension

- Bp above >140/90.
- It is asymptomatic and is a contributing factor to myocardial infarctions.

Types of Hypertension

Primary.

- It is elevated Bp of unknown cause.

Secondary.

- It is elevated of Bp of known cause, such as renal disease, pregnancy.

OXYGEN SATURATION

Pulse oximetry:

- Noninvasive device that measure an 02 saturation (sao2), the amount of oxygenated hemoglobin in arterial blood.
- It is connected to a sensor attached to the client's finger, toe, nose, earlobe, or forehead.
- It can detect hypoxemia before clinical signs and symptoms.