Vital Signs

Learning Objectives

- ✓ Describe the procedures used to assess the vital signs: temperature, pulse, respiration, and blood pressure.
- ✓ Identify factors that can influence each vital sign.
- ✓ Identify equipment routinely used to assess vital signs.
- ✓ Identify rationales for using different routes for assessing temperature.
- ✓ Take vital signs and interpret the finding.
- ✓ Document the vital signs.

purpos

Vital Signs (Cardinal Signs)

- Vital signs reflect the body's physiologic status and provide information critical to evaluating homeostatic balance.
- Includes:
  - temperature,
  - Pulse Rate,
  - Respiratory Rate), and
  - Blood Pressure)

Purposes

- ✓ To obtain base line data about the patient condition
- ✓ for diagnostic purpose
- ✓ For therapeutic purpose

Equipment

- Vital sign tray
- Stethoscope
- Sphygmomanometer
- Thermometer
- Second hand watch
- Red and blue pen
- Pencil;
- Vital sign sheet
- Cotton swab in bowel
- Disposable gloves if available
- Dirty receiver kidney dish

yr

Times to Assess Vital Signs

- ✓ On admission – to obtain baseline date
- ✓ When a client has a change in health status or reports symptoms such as chest pain or fainting
- ✓ According to a nursing or medical order
- ✓ Before and after the administration of certain medications that could affect RR or BP (Respiratory and CVS
- ✓ Before and after surgery or an invasive diagnostic procedures
- ✓ Before and after any nursing intervention that could affect the vital signs. E.g. Ambulation
- ✓ According to hospital /other health institution policy.

1. Temperature

⇒it is the hotness or coldness of the body. It is the balance b/n heat production & heat loss of the body.

⇒Normal body temperature using oral 37^0 Celsius or $98.6\ ^0$ F.

Two kinds of body temprature

1. **Core Temperature**
   - ✓ Is the temperature of internal organs and it remains **constant** most of the time (**37°c**); with range of 36.5-**37.5°c.**
   - ✓ Is the Temperature of the deep tissues of the body
   - ✓ Remains relatively constant
   - ✓ measure with thermometer

Cont....

2. Surface Temperature:

- **Surface body temperature**: - is the temperature of the skin, subcutaneous tissue & fat cells and **it rises & falls** in response to the environment
- (Ranges b/n 20-40^{o}c).
- It doesn't indicate internal physiology.

Alterations in Body Temperature

- ✓ Normal body temperature is 37^0 C or 98.6 ^{0}F
- ✓ range is 36-38 ^{0}c (96.8 – 100 ^{0}F)
- ✓ Body temperature may be abnormal due to **fever** (high temperature) or **hypothermia** (low temperature).
- ✓ ***Pyrexia*, fever:** a body temperature above the normal ranges 38 ^{0}c – 41^0 c (100.4 – 105.8 F)
- ✓ ***Hyper pyrexia***: a very high fever, such as 41^0 C > 42 ^{0}c leads to death.
- ✓ ***Hypothermia:* –** body temperature between 34 ^{0}c – 35 ^{0}c, < 34 ^{0}c is death

Common Types of Fevers

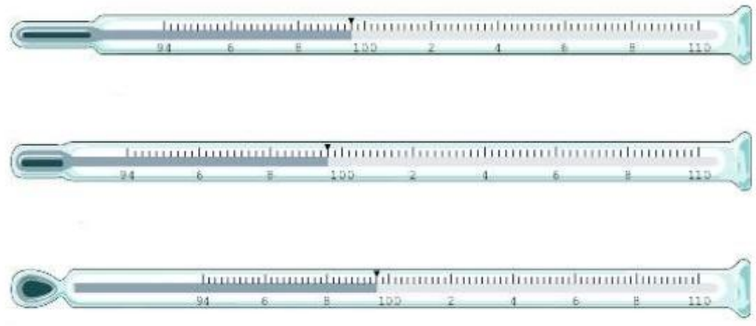
1. **Intermittent fever:** the body temperature alternates at regular intervals between periods of fever and periods of normal or subnormal temperature.
2. **Remittent fever**: a wide range of temperature fluctuation (more than 2 ^{0}c) occurs over the 24 hr period, all of which are above normal
3. **Relapsing fever**: short febrile periods of a few days are interspersed with periods of 1 or 2 days of normal temperature.
4. **Constant fever:** the body temperature fluctuates minimally but always remains above normal

Factors Affecting Body Temperature

1. Age
2. Diurnal variations (circadian rhythm
3. Exercise
4. Hormones
5. Stress
6. Environment

Sites to Measure Temperature

- Oral
- Rectal
- Auxiliary
- Tympanic



- **Thermometer:** is an instrument used to measure body temperature

Oral temperature

- Obtained by putting the thermometer under the tongue.
- Its measurement is 0.65 less than rectal T°. and 0.65 greater than axillary temp.
- Leave 3 to 5 minutes in place
- Is the most common site for temp measurement
- This site is inconvenient for
  - unconscious patients,
  - infants and children, &
  - patients with ulcer or sore of the mouth,
  - pts with persistent cough.

Cont.....

- ✓ Advantage – easy access & pt comfort
- ✓ Disadvantage It can lead to a false reading if a person has taken **hot** or **cold** food/ drink by mouth, & has **smoked** so we have to wait for at least 10-15min, after meal or smoking.

contraindication

- ✓ Pts who cannot follow instruction to keep their mouth closed
- ✓ Child below 7 yrs
- ✓ Epileptic, or mentally ill patients
- ✓ Unconscious
- ✓ Clients receiving O2
- ✓ Clients with persistent cough
- ✓ Uncooperative or in severe pain
- ✓ Surgery of the mouth
- ✓ Nasal obstruction
- ✓ If patient has nasal or gastric tubs in place

Rectal Temperature:

- ✓ Obtained by inserting the thermometer into the rectum or anus.
- ✓ It gives **reliable** measurement & reflects the core body temperature.
- ✓ Hold the thermometer in place for 3 to 5 minutes
- ✓ More accurate, most reliable, is > 0.65° c (1 °F) higher than the oral temperature. because few factors can influence the reading
- ✓ disadvantages are:
  - ❑ injure the rectum, it needs privacy,
  - ❑ it is inappropriate for patients with diarrhea & anal fissure.

Contraindications

- ✓Rectal or perennial surgery;
- ✓Fecal impaction
- ✓Rectal infection
- ✓Rectal infection;
- ✓newborn infants

Tympanic Temperature

- ✓ Placed in to the client's outer ear canal.
- ✓ It reflects the core body temperature
- ✓ Is readily accessible and permits rapid temp readings in pediatric , or unconscious pts
- ✓ It is very fast method 1 to2 seconds.
- ✓ Disadvantages: –
  - ❑ it may be uncomfortable involves risk of injuring the membrane
  - ❑ Presence of cerumen (wax) can affect the reading.
  - ❑ Right & left measurements may differ.

Axillary tempreture

- ✓ it is safe and non-invasive
- ✓ Is recommended for infants and children
- ✓ disadvantage
  - ❑ long time (5-10min.)
  - ❑ less accurate as it is not close to major vessels.
- ✓ Is considered the least accurate & least reliable of all the sites because the temp obtained using this route can be influenced by a number of factors e.g. bathing & friction during cleaning
- ✓ Is the route of choice in pt's that cannot have their temp measured by other routes.

Cont..

Route	Normal Range °F / °C	Sites
Oral	98.6 °F / 37.0 °C	Mouth
Tympanic	99.6 °F / 37.6 °C	Ear
Rectal	99.6 °F / 37.6 °C	Rectum
Axillary	97.6 °F / 36.6 °C	Axilla (armpit)

Pulse

- ✓ Pulse is a wave of blood created by the contraction of left ventricle.
- ✓ pulse reflects the heart beat
- ✓ Stroke volume and the compliance of arterial wall are the two important factors influencing pulse rate.
- ✓ Pulse rate is regulated by autonomic nervous system.

Cont....

- ***Peripheral Pulse:*** is a pulse located in the periphery of the body e.g. in the foot, and or neck
- ***Apical Pulse (central pulse):*** it is located at the apex of the heart
- The PR is expressed in beats/ minute (BPM)
- The difference between peripheral and apical pulse is called pulse deficit, and it is usually zero.

Cont....

- Pulse is assessed for
  - **rate** (60-100bpm),
  - **rhythm** (regularity or irregularity),
  - **Volume**,
  - **elasticity of arterial wall**.
- The pulse is commonly assessed by palpation (feeling) and auscultation (hearing using a stethoscope).

Factors Affecting Pulse Rates

- ***Age***
  - The average pulse rate of an infant ranges from 100 to 160 BPM
  - The normal range of the pulse in an adult is 60 to 100 BPM
- ***Sex:*** ***Sex:*** after puberty the average males PR is slightly lower than female

Cont.....

- Autonomic Nervous system activity
  - Stimulation of the parasympathetic nervous system results in decrease in the PR
  - Stimulation of sympathetic nervous system results in an increased pulse rate
  - Sympathetic nervous system activation occurs on response to a variety of stimuli including
    - Pain ,anxiety ,Exercise ,Fever
    - Ingestion of caffeinated beverages
    - Change in intravascular volume

Cont....

- ***Exercise:*** PR increase with exercise
- ***Fever:*** increases PR in response to the lowered B/P that results from peripheral vasodilatation – increased metabolic rate
- ***Heat:*** increase PR as a compensatory mechanism
- ***Stress:*** increases the sympathetic nerve stimulation

Cont....

- ***Position changes**:*
  - ✓ a sitting or standing position blood usually pools in dependent vessels of the venous system. B/c of decrease in the venous blood return to heart and subsequent decrease in BP increases heart rate.

Cont....

- Medication
  - Cardiac medication such as digoxin decrease heart rate
  - Medications that decrease intravascular volume such as divretics may increase pulse rate
  - Atropine in hibits impusses to the heart from the parasympathetic nervous system, causing increased pusse rate
  - Propranolol blocks sympathetic nervous system action resulting in decreased heart trate sites used for measuring pulse rate

Pulse Sites

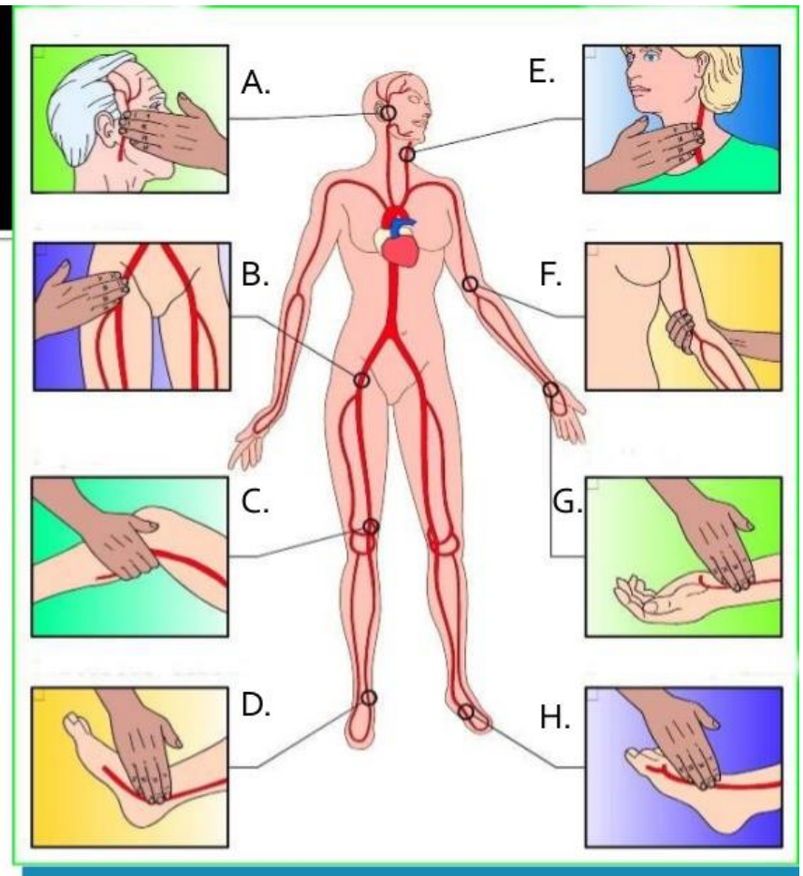
- **Carotid:** at the side of the neck below tube of the ear (where the carotid artery runs between the trachea and the sternocleidomastoid muscle)
- **Temporal:** the pulse is taken at temporal bone area.
- **Apical:** at the apex of the heart: routinely used for infant and children < 3 yrs
- In adults – Left mid-clavicular line under the 4^{th}, 5^{th}, 6^{th} intercostal space

Cont.....

- **Brachial:** at the inner aspect of the biceps muscle of the arm or medially in the antecubital space (elbow crease)
- **Radial:** on the thumb side of the inner aspect of the wrist – readily available and routinely used
- **Femoral:** along the inguinal ligament. Used or infants and children
- **Popiliteal:** behind the knee. By flexing the knee slightly
- **Posterior tibial:** on the medial surface of the ankle
- **Pedal (Dorsal Pedis):** palpated by feeling the dorsum (upper surface) of foot

Pulse

- A wave of blood flow created by a contraction of the heart.



Method

- **Pulse: is commonly assessed by palpation (feeling) or auscultation (hearing)**
- The middle 3 fingertips are used with moderate pressure for palpation of all pulses except apical;
- Assess the pulse for
  - Rate
  - Rhythm
  - Volume
  - Elasticity of the arterial wall

Cont....

Pulse Rate

- ✓ Normal 60-100 b/min (80/min)
- ✓ Adult PR > 100 BPM is called tachycardia
- ✓ Adult PR < 60 BPM is called bradycardia

Cont....

Pulse Rhythm

- The pattern and interval between the beats, random, irregular beats – dysrythymia

Pulse Volume

- the force of blood with each beat
- A normal pulse can be felt with moderate pressure of the fingers
- Full or bounding pulse forceful or full blood volume destroy with difficulty
- Weak, feeble readily destroy with pressure from the finger tips

Cont....

Elasticity of arterial wall

- A healthy, normal artery feels, straight, smooth, soft, easily bent
- Reflects the status of the clients vascular system

Cont....

- **If the pulse is regular, measure (count) for 30 seconds and multiply by 2**
- **If it is irregular count for 1 full minute.**
- ***Each heart beat consists of two sounds***
- s1 - is caused by closure of the mitral and tricuspid valves separating the atria from the ventricles
- S2 – is caused by the closure of the plutonic and aortic values
- The sounds are often described as a muffled "lub – bub"

Respiration

- **Respiration rate (RR):-**Respiration is the act of breathing and includes the intake of oxygen and removal of carbon-dioxide.
- **Ventilation** is also another word, which refers to movement of **air** in and out of the lung.
- **Hyperventilation: -** is a very deep, rapid respiration.
- **Hypoventilation**: - is a very shallow respiration.

Two Types of Breathing

1. Costal (thoracic)

- ✓ Observed by the movement of the chest up ward and down ward.
- ✓ Commonly used for adults

2. Diaphragmatic (abdominal)

- ✓ Involves the contraction and relaxation of the diaphragm, observed by the movement of abdomen.
- ✓ Commonly used for children.

Factors affecting respiration

- Age Normal growth from infancy to adult hood results in a larger lung capacity. As lung capacity increases, lower respiratory rates are sufficient to exchange
- Medications Narcotics decrease respiratory rate & depth
- Stress or strong emotions increases the rate & depth of respirations.
- Exercise increases the rate & depth of respirations

Cont.....

- Altitude The rate & depth of respirations at higher elevations (altitude) increase to improve the supply of oxygen available to the body tissues
- Gender Men may have a lower respirations rate than women because men normally have a larger rung capacity than women
- Fever increases respiratory rate

Assessment

- The client should be at rest
- Assessed by watching the movement of the chest or abdomen.
  - Rate,
  - rhythm,
  - depth and
  - special characteristics of respiration are assessed

Cont.....

Rate:

- Is described in rate per minute (RPM)
- Healthy adult RR = 15- 20/ min. is measured for full minute, if regular for 30 seconds.
- As the age decreases the respiratory rate increases.
- Eupnea- normal breathing rate and depth
- Bradypnea- slow respiration
- Tachypnea - fast breathing
- Apnea - temporary cessation of breathing

Cont.....

Age	Average Range/Min
New born	**30-80**
Early childhood	20-40
Late childhood	15-25
Adulthood-male	14-18
Female	16-20

Cont.....

Rhythm:

- is the regularity of expiration and inspiration
- Normal breathing is automatic & effortless.

Depth:

- described as normal, deep or shallow.
- Deep: a large volume of air inhaled & exhaled, inflates most of the lungs.
- Shallow: exchange of a small volume of air minimal use of lung tissue.

Blood Pressure:

- ✓ **It is** the force exerted by the blood against the walls of the arteries in which it is flowing.
- ✓ It is expressed in terms of millimeters of mercury (mm of Hg).

There are two types of Bp.

- **Systolic pressure** is the maximum of the pressure against the wall of the vessel following ventricular contraction.
- **Diastolic pressure** is the minimum pressure of the blood against the walls of the vessels following closure of aortic valve (ventricular relaxation).

Cont.....

- ✓ BP is measured by using an instrument called Bp cuff (sphygmomanometer) & stethoscope and
- ✓ the average normal value is **120/80**mmHg for adults.
- ✓ brachial artery and popliteal artery are most commonly used.
- ✓ It is measured by securing the **Bp** cuff to the upper arm & thigh placing the stethoscope on brachial artery in the antecubital space & popliteal artery at the back of the knee.
- ✓ **Pulse pressure**: is the difference between the systolic and diastolic pressure

Factors Affecting Blood Pressure

- Fever
- Stress
- Arteriosclerosis
- Exposure to cold
- Obesity
- Hemorrhage
- Low hematocrit
- External heat

Sites for Measuring Blood Pressure

- Upper arm (using brachial artery (commonest)
- Thigh around popliteal artery
- Fore -arm using radial artery
- Leg using posterior tibial or dorsal pedis

Cont.....

- A persistently high Bp, measured for greater than three times is called **hypertension** & that persistently less than normal range is called **hypotension.**
- Because of many factors influencing Bp a single measurement is not necessarily significant to confirm hypertension.
- When the cause of hypertension is known it is called secondary hypertension and when the cause is unknown is called primary/essential hypertension.

Assessing Blood pressure

Purpose

- ✓ To obtain base line measure of arterial blood pressure for subsequent evaluation
- ✓ To determine the clients homodynamic status
- ✓ To identify and monitor changes in blood pressure.

Equipment

- Stethoscope
- Blood pressure cuff of the appropriate size
- Sphygmomanometer

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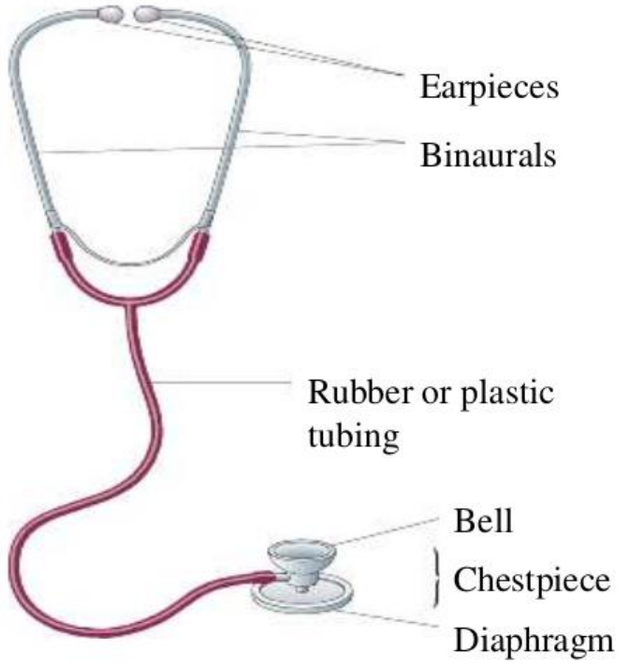
Earpieces
Binaurals
Rubber or plastic tubing
Bell
Chestpiece
Diaphragm