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Nursing Fundamentals – Vital signs

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Vital signs:

- Heart rate
- Blood pressure
- Respirations
- Pulse oximetry
- Temperature
- Pain (Discussed in a separate lecture)

Heart rate (HR):

- Normal heart rate is 60-100
    - Bradycardia is the term for a heart rate below 60
    - Tachycardia is the term for a heart rate above 100
- Heart rate is a sign of cardiac health
- Heart rate is lower when we are asleep and at rest
- Heart rate is higher when we are active or under stress
- Can be assessed with a cardiac monitor, pulse oximeter, auscultation, and by palpation
- Pulse can be assessed at the carotid, brachial, radial, femoral, popliteal, and pedal locations
    - Do not assess both sides of the carotid at the same time
    - All other locations can be assessed bilaterally and simultaneously
- Rate should be regular and consistent
- Heart rates are significantly higher in newborns and infants
- Heart rate increases in pregnancy
- Certain medications can cause tachycardia such as stimulants
- Certain medications can cause bradycardia such as beta blockers
- Certain diseases can cause tachycardia such as hyperthyroidism and pheochromocytoma
- Certain diseases can cause bradycardia such as hypothyroidism and heart blocks
- A low heart rate can result in a low blood pressure
- Very fast heart rates can also cause a low blood pressure
- Generally, a high heart rate increases the blood pressure
- Symptom of a fast heart rate is palpitations
- Symptoms of a slow heart rate include lightheadedness and syncope
- Heart rate serves to provide perfusion as assessed by the blood pressure
    - A low HR may be acceptable if the BP is normal

Blood pressure (BP):

- Blood pressure is the indicator of perfusion

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- Normal is a systolic below 120 and a diastolic below 80
- A systolic in the 120s in considered an elevated BP
- A systolic above 130 or a diastolic over 80 is considered hypertensive (AHA/ACC)
- A systolic below 90 is considered hypotensive
- BP can be assessed manually or by a machine (BP monitor)
    - A BP can also be assessed by palpation. This is for unique situations and is less accurate
- Patient should be seated for at least five minutes prior to measurement
    - Feet should be flat on the ground and the arm should be resting on a surface
    - Recent caffeine or nicotine will cause an increased BP
- Ensure the cuff size is correct. A cuff that is too large will show a low BP and a cuff that is too small will show a high BP.
- Mean arterial pressure (MAP) is another data set used to determine perfusion
    - MAP is calculated as follows: 2 times the diastolic plus the systolic all divided by three
    - Example: 120/80 is 80x2+120=280 and then 280/3=93.3
- A MAP below 60 or 65 is considered hypotensive
    - BP issues come down to three cornerstones. An issue with any of these can affect the BP
        - Volume (blood)
        - Vessels
        - Pump (Heart)
- The most common method to treat hypotension acutely is to administer fluids
- BP is significantly lower in infants and children
- BP assessments are to be correlated with other findings such as capillary refill
- Pregnancy causes an increased and decreased BP depending on the trimester
- BP increases during periods of stress
- BP decreases during sleep and rest
- Orthostatic BP assessment is where the BP is assessed with the patient lying down, seated, upon standing, (and after standing for several minutes).
    - A drop of 20 in the systolic or 10 in the diastolic is considered positive for orthostatic hypotension
- Causes of hypotension include blood loss, heart failure, and septic shock
- Causes of hypertension include primary hypertension, pheochromocytoma, and kidney disease
- Symptoms of hypotension include dizziness, lightheadedness, and syncope
- Symptoms of acute hypertension include a headache
    - Chronic hypertension is often asymptomatic

Respirations (RR):

- Normal respiratory rate is 12-20
- Slower than 12 is called bradypnea
- Faster than 20 is considered tachypnea
- Apnea is the term for not breathing
- Respirations are also assessed based on effort and depth
    - They should happen without deliberate effort
        - Signs of increased effort include use of accessory muscles or tripod positioning

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    - They should have sufficient depth to move the necessary amount of air
- Lung sounds are assessed both separately and together with respirations
- Ventilation is the term for moving air in and out of the body
- Respiratory rate becomes altered when the patient knows it is being observed
    - A common practice is to feel for the pulse when actually assessing the respirations
- Respirations can be decreased due to medications such as opioids
- Respirations can be increased due to conditions such as acidosis and stress
- Respirations serve the purpose of bringing oxygen into the body to enter central circulation
    - A low RR may be acceptable if the SPO2 is normal

Pulse oximeter (SPO2):

- Normal pulse oximetry reading is 95% or greater (Some sources use 94%)
- Pulse ox is assessed with a finger probe
    - Probes can also be placed on the forehead, ear, and toes
    - Can be assessed invasively as well
- This provides a measurement of how much oxygen saturation exists in the hemoglobin
    - This means of the total amount of oxygen the blood can carry, how much is it carrying?
- In order to have a normal pulse ox:
    - The patient must be breathing, bringing air into the lungs
    - The air they are breathing must contain oxygen
    - The oxygen is able to diffuse into the bloodstream
    - The bloodstream is able to carry the oxygen around the body (or at least past the probe)
- A low pulse ox can be a result of a breakdown in any of these issues
    - Most commonly it is related to not breathing in enough oxygen
- False readings can be obtained by certain unique situations such as CO poisoning
- Nail polish and fake nails can interfere with the probes reading
- Poor distal circulation can also make it difficult to obtain readings
- A low pulse ox is initially always treated with oxygen
- Patients with COPD may always have a low pulse ox reading (can be normally as low as the mid to upper 80s)
- Pulse oximeters provide a waveform
    - The reading should not be considered accurate in the absence of a proper waveform
- Recognize that there is a slight delay from the time of treatment to the pulse ox reading
- Symptoms of hypoxia include altered mental status
- Hyperoxia cannot be assessed with pulse oximetry

Temperature (T):

- Normal temperature is roughly 37 degrees Celsius or 98.6 degrees Fahrenheit
- Most of healthcare uses Celsius
    - 38 degrees is 100.4
        - This is a commonly accepted threshold for a fever
- Can be assessed many ways including tympanic, oral, rectal, axillary, and invasively
- High temperature is called hyperthermia (fever)

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- Low temperature is called hypothermia
- Rectal is the most common route used in infants and when needing increased accuracy
- There are many causes of increased temperature other than infection

Always assess vital sign trends a second set of vitals shows the direction your patient is heading

Baseline vitals is the term for the starting point of your patient upon initial assessment

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