NR224 EdaptWeek2

VitalSigns

Introduction to VitalSigns

Vitalsigns serve as astarting pointin assessing the overall functioning ofthe body andare asnapshotofapointin time that reffectsthe immediate statusofabaseline ortrendsofthe valuesovertime. Vitalsignsinclude the measurementoftemperature, pulse, respirations, bloodpressure, and O_2 saturation.

There are normally five vitalsigns thatare measured: temperature, pulse, respirations, bloodpressure, andpain. Oxygen saturation isalso frequentlyincluded.

The nurse mustbe able to do the following:

- *Measure vitalsigns correctly.*
- *Use the equipmentneededforvitalsign measurements correctly.*
- *Understandwhatthe vitalsigns tellyou aboutthe client.*
- *Be organizedanduse asystematic approach when measuring vitalsigns.*
- *Delegate vitalsign measurements to otherhealthcare providers.*
- *Analyze andinterprettrends overtime.*
- *Respondto changes in vitalsigns quickly andappropriately.*
- *Communicate anddocumentfindings accurately.*

Vitalsignsalone are notenough to evaluate body functioning ordetermine problem-solving steps. Vitalsigns are one setofclues usedincollaboration with otherphysiologicalmeasurementsandassessmentfindingsforthe basisofproblem solving and indication ofbasic body functioning.

AbnormalVitalSigns

- *The client'sbaseline range ofvitalsigns, which may ormay nottypically run inthe normalrange, incomparison to currentfindings.*
- *The client's health history, therapies, andprescribedandover-the-countermedications as these may predictably affect one ormore vitalsigns; the impactofvitalsign measurementson medication administration, andvice versa. Some medicationsare only given when aparticularvitalsign iswithin aparticularrange. Andsome medicationsare contraindicatedwhen certain vitalsignsare withinacertain range.*
- *Environmentalfactors may falsely affectvitalsigns(such as the effectofawarm, humidroom on the client's temperature).*
- *Ensurethatthevitalsign equipmentisworking correctly priortomeasurementinorderto provideaccurate findings, andselectthe correctequipmentforthe client's condition andcharacteristics (such as age andsize).*
- *An acute episode ofanxiety can cause the physiologic response ofan increasedpulse rate.*
- *A lowheartrate means the body is receiving less blood/perfusion, which can cause decreasedcardiac output.*
- *Ineffective, rapidrespirations resultin adecrease inserum oxygen andimpairedgas exchange.*
- *A clientwho has hadasurgicalprocedure is likely to be in acute pain, which impacts vitalsign results.*
- *A decreasedpulse oximetry indicates insufficientoxygenin the bloodand, therefore, ineffective peripheraltissue perfusion.*

VitalSigns With Pediatric Clients

The client'sage, gender, activity, medication, andhealth statusinffluence theirvitalsigns.

Comparedwith adults, ininfants andchildren:

- *pulse andrespirations run higher*
- *bloodpressure runs lower*

- brachialandapicalpulse are the bestsites forassessing pulse
- respirations tendto be less regularin

infants Vitalsigns inolderadults are influencedby aging.

Delegating VitalSigns

Vitalsignmeasurements are the nurse's responsibility. However, when appropriate, nurses may delegate them to unlicensed nursing assistantpersonnelafterthe nurse has determinedthatthe client's condition is stable. The nurse mustreviewthe vital sign dataanduse nursing knowledge to follow the nursing process basedon the dataobtained. The skill ofapicalpulse measurementcannotbe delegated. The nurse completes the vitalsigns upon admission to establish baseline vitalsigns andto assess the client's stability before delegating.

Determining ClientHealth by Monitoring VitalSigns

Recallfrom previous knowledge that:

- Vitalsigns andotherphysiologicalmeasurements oftenprovide the basis forproblem solving.
- Carefultechnique ensures accurate findings.
- Temperature, pulse, respirations, bloodpressure, andoxygensaturation are usually assessedatthe same time atset intervals.
- The ability to obtain accurate measurements ofvitalsigns is criticalbecause vitalsigns are an indication ofbasic body functioning.
- Itis appropriate to begin the physicalassessmentby obtaining this data.
- The skills requiredto measure vitalsigns are simple, butthe simplicity shouldneverreduce the criticalvalue ofthe task.

Changes in vitalsigns signalachange in physiologicalfunction andcan change basedon many factors, such as:

- environmentaltemperature
- physicalexertion
- effects ofillness

Assessmentofvitalsigns provides:

- cues foridentifying nursing diagnoses, implementing plannedinterventions, andevaluating outcomes
- monitoring ofaclient's condition, identification ofproblems, andevaluation ofintervention responses
- datausedto determine aclient's health status andneedformedicalornursing interventions

Considerations forVitalSigns

Vitalsigns are interrelated. A rise in temperature ofone degree Fahrenheitmay cause an increase inthe pulse rate by fourbeats perminute. Respiratory rates andbloodpressure readings also increase with arise intemperature. When bloodpressure falls because ofahemorrhage, the pulse andrespirations increase to compensate.

ClientCondition

A client's condition determines when, where, how, andby whomvitalsigns are measured.

- The frequency ofvitalsign measurements is keptto aminimum butwillikely be increasedas the client's condition worsensandbecomes more acute.
- The nurse is responsible forjudging whethermore frequentassessments are necessary.

Assessing ClientStatus

Nurses measure vitalsigns to assess aclient's status as partof:

- baseline, admission, androutine physicalassessments
- areviewoforchange inaclient's condition

- before, during, andaftercertain medications and/orbloodadministration
- ahealthcare provider's orderandin preparation forahealthcare provider's exam
- afacility's standardofpractice andpolicy
- before, during, andafteran invasive procedure and/ornursing interventions thatimpactavitalsign

Delegating VitalSign Measurements

- Vitalsignmeasurements arethe nurse's responsibility. However, when appropriate, they may be delegatedto unlicensed nursing assistantpersonnelafterthe nurse hasdeterminedthatthe client's condition isstable.
- The nurse mustreviewthe vitalsign dataanduse nursing knowledge to fo lowthe nursing process basedon the data obtained.

Note: A nurse cannotdelegate the skilofmeasuring an apicalpulse.

InterrelatedVitalSigns

Anincreasedtemperature may cause anincreasedpulse rate.

An increasedtemperature may cause an increasedrespiratory rate.

Anincreasedtemperature may cause anincreasedbloodpressure.

A decreasedbloodpressure may cause anincreasedpulse rate.

A decreasedbloodpressure may cause anincreasedrespiratory rate.

NormalRanges ofVitalSigns

Vitalsign monitoring is afundamentalcomponentofnursing care. As you learn to assess vitalsigns, itis importantto know the normalvalues so thatyou wilbe able to recognize andrespondto abnormalvitalsigns. Reviewthe image shown here for the acceptable ranges ofvitalsigns in adults.

A client's age, gender, activity, medications, andhealth status influence vitalsigns. Comparedwith adults, ininfants andchildren:

- pulse andrespirations run higher
- bloodpressure runs lower
- brachialandapicalpulse are the bestsites forassessing pulse
- respirations tendto be less regularin infants Vitalsigns inolderadults are influencedby aging.

Assessing VitalSigns

Comparedwith adults:

- The pulse rate tends to run higherininfants andchildren.
- The respiratory rate tends to run higherin infants andchildren.
- The bloodpressure tends to runlowerin infants andchildren.
- The apicalandbrachialpulse are the bestsites forassessing pulse in infants andchildren.
- The respirations tendto be less regularin infants.

Analyzing VitalSigns

These are typicalfactors thatimpactvitalsign measurements:

- The client's baseline range ofvitalsigns, which may ormay nottypicaly run inthe normalrange.
- The client's health history, therapies, andprescribedandover-the-countermedications as these may predictably affect one ormore vitalsigns.
- Environmentalfactors may falsely affectvitalsigns(such as the effectofawarm, humidroom on the client's temperature).
- Some medications are only given whenaparticularvitalsign iswithin aparticularrange. Andsome medications

are contradictedwhen certainvitalsigns are within acertain range.

- Vitalsign equipmentmustbe working correctly before measurements in orderto provide accurate findings.
- Equipmentmustbe selectedcorrectly forthe client's condition andcharacteristics (such as age andsize).

Priority Hypothesis andDocumentation

There are many causesforabnormalvitalsignsthatthe nurse can actupon. Possible nursing diagnosesfocuson whena client's vitalsigns are abnormal, including:

- riskforimbalancedbody temperature (hyperthermiaorhypothermia)
- ineffective thermoregulation
- activity intolerance
- anxiety
- decreasedcardiac output
- deficientorexcess ffluidvolume
- impairedgas exchange
- acute pain
- ineffective peripheraltissue perfusion
- riskofinjury

Itis very importantto accurately recordandreportvitalsign measurements in the client's electronic medicalrecord(EMR).

- Inform the healthcare providerofabnormalvitalsigns andsubsequentfo llow-up assessmentdatayou obtain.
- Documentthe route andsite usedto obtaintemperature, bloodpressure, pulse, andoxygen saturation.
- Documentwhen vitalsigns are abnormalforthe client's expectedvalues by recording the finding, any intervention, and clientresponse.
- Early Warning Scores (EWS) are usedby many healthcare organizations. When vitalsign measurements are entered into the EMR, this system identifies subtle changes which may be the firstsigns ofachange in the client's condition andalerts nurses.

Documenting VitalSigns

- Inform the healthcare providerofabnormalvitalsigns andsubsequentfo llow-up assessmentdatayou obtain. Documentthe route andsite usedto obtaintemperature, bloodpressure, pulse, andoxygen saturation. Documentwhen vitalsigns are abnormalforthe client's expectedvalues by recording the finding, any intervention, andclientresponse.
- Documentation isimportantbutnotuntilafterpriority nursing actions have been taken, such as analyzing the vital signsandnotifying the healthcare providerwhen appropriate.
- Early warning scores (EWS) are usedby many healthcare organizations. When vitalsign measurements are enteredinto the electronic health record(EHR), EWS identifies subtle changes, which may be the firstsigns ofachange in the client's condition, andalerts nurses. The nurse shouldneverignore the EWS andan EWS warning doesnotrequire a healthcare providerto be notified. Furtherassessmentwouldbe the nextstep to determine the propercourse ofaction.

Obtaining VitalSigns

The client's baseline range ofvitalsigns may ormay nottypicaly runin the normalrange. The client's health history, therapies, andprescribedandover-the-countermedications may predictably affectone ormore vitalsigns. Some medications are only given whenaparticularvitalsign is withinaparticularrange. Andsome medications are contradictedwhencertain vitalsigns are withinacertain range.

This bloodpressure isthe baseline forthisclient. Itiselevatedinterms ofthe standardparameters but, forthisclient, itis normalandthere are no additionalcuesforconcern. Before giving the medication asordered, the nurse wouldstil complete

the

nursing assessmentincase there are otherfactors ofconcern andassess the clientafterthe dose has takeneffectto determine the effecton the clientandthe bloodpressure.

Assessing VitalSigns

The client's respiratory rateandpulse oximetry findings require immediate action. The priority hereis to stabilize the clientwith regardto airway, breathing, andcirculation (ABCs), which wouldinclude assessing the clientforadditionalcues ofrespiratory distress to be immediately addressed.

*Afterstabilizing the clientandaddressing theirurgentneeds, the nurse wi**l**ca**l**the healthcare providerto discuss the status andestablish aplan ofcare. Ca**l**ing themrightaway wouldnotbe the priority.*

*Vitalsign results mustnotbe taken as an isolatedvalue butshouldbe usedas aguide basedon many factors thatmay affectthe assessment. The client's age andhealth status, aswe**l**asthe typicalnormalrange forthisclient, are a**l**cues thathelp determine the course ofaction. Also, wasthe equipmentfunctioning correctly?Wasthe correctsize ofbloodpressure cuffused?Hadthe clientjustbeen up walking?Is the room too warm?Is the clientin pain?There are severalvitalsigns here thatare abnormal, notjustone. Togetherthey paintapicture, butnotin isolation. More datais neededto determine actionsto take afterthe client is stabilized.*

ElevatedPulse Rate

Aging is notaknowncontributing factorto an elevatedpulse rate. An elevatedpulse is more typicalin infants andchildren.

The nurse wouldd etermine ifthis pulse rate is typicalforthis client, given whattheirbaseline has been andmedical history/status. Activity can cause atemporary elevation inpulse rate.

Here is amemory aidto help as you lookforcues: 3 Hs andP

- *hypoxia*
- *hyperthermia*
- *hypovolemia*
- *pain*

Temperature

Introduction to Temperature

Radiation: Heat is transferred between the surfaces of two objects without direct contact. Surgical rooms are cool, and the client's skin is exposed, so radiant heat loss can be significant.

Conduction: Heat is transferred from one object to another through direct contact. Conductive heat loss is minimized when a person wears several layers of clothing.

Convection: Heat is transferred away through air movement. Convective heat is lost when a person is using a fan to cool down. Heat is lost faster when the skin is moistened.

Evaporation: The constant transfer of heat energy occurs when a liquid becomes a gas, such as with perspiration.

Treatment of Fever

Shivering is the involuntary skeletal muscle movements as a response to bodily temperature differences and greatly increases heat production and is therefore counterproductive in a client with a fever.

To treat a fever, maximize heat loss by limiting blankets and clothing without causing shivering and keeping the client's clothing and bed linens dry, controlling the room temperature, and applying a damp cloth to the forehead. It is no longer recommended practice to use baths and ice packs to reduce fever due to the risk for inducing shivering.

Tympanic Thermometer

Tympanic thermometer measurements are reflective of core body temperature, not body surface temperature. They provide a rapid reading. Tympanic thermometers are the most accurate compared to oral, axillary and rectal. They are also not influenced by environmental temperatures.

Thermoregulation, Heat Loss, and Heat Production

Heat Loss

Heat loss is a normal process that occurs through radiation, conduction, convection, and evaporation.

Radiation: Heat is transferred between the surfaces of two objects **without direct contact**.

- Peripheral vasodilation = increased blood flow from internal organs to skin = increased radiant heat loss
- Peripheral vasoconstriction = lessens radiant heat loss
- Consider these scenarios:
    - When surgical rooms are cool and the patient's skin is exposed, radiant heat loss can be significant.
    - If the temperature in the patient's room is warmer than the skin, the body will absorb heat through radiation.
    - If the client is standing, they will have a greater surface area exposed than when sitting or lying in a fetal position, and therefore radiant heat loss is greater.
    - Removing a patient's clothing or blankets promotes radiant heat loss.
    - The patient dressed in dark, closely woven clothing will lose less heat to radiation.

Conduction: Heat is transferred from one object to another **through direct contact**.

- Conductive heat is lost when warm skin touches a cooler objects such as the use of an ice pack or a cool cloth.
- Conductive heat loss is minimized when a person wears several layers of clothing.

Convection: Heat is transferred away **through air movement**.

- Convective heat is lost when a person is using a fan to cool down. Heat is lost faster when the skin is moistened.

Evaporation: The constant transfer of heat energy occurs when a liquid becomes a gas.

- Water and heat loss occurs when moisture from the skin (perspiration, to cool the skin) and from the lungs (respiration) evaporates constantly, approximately 600 to 900 mL a day.
- Diaphoresis: visible perspiration (typically the forehead and upper thorax) **Heat Production**

Metabolism is the chemical reaction in a cell of the body, and this reaction produces heat. The higher the metabolism, the more heat that is produced, and vice versa. The production of heat occurs during rest, voluntary movements, involuntary shivering, and non-shivering thermogenesis.

Basal metabolism: The basal metabolic rate (BMR) is the heat produced by the body at absolute rest.

- Absence of thyroid hormones reduces BMR by half = decreased heat production
- Large amounts of thyroid hormones greatly increase the BMR = increased heat production
- BMR in men is higher than in women due to the hormone testosterone.

Voluntary movements: muscular activity during exercise requires more energy = BMR increases during activity = heat production greatly increases. **Shivering**: involuntary skeletal muscle movements as a response to bodily temperature differences.

- The bodily temperature differences result in significant energy demands and lead to increasing heat production to balance body temperature that helps the shivering stop.
- This draining of energy sources can be serious, particularly for clients who are vulnerable.
- Shivering will increase the body temperature as it is intended to do. Therefore, be aware that shivering in a client with a fever is counterproductive.

Non-Shivering Thermogenesis: occurs in those who cannot shiver in order to increase heat production (such as neonates who instead metabolize brown fat to produce heat).

Thermoregulation

In order to function effectively, the body's temperature must remain in the optimal range of 36° to 38°C (96.8° to 100.4°F). Tom's current temperature along with the fact that he is perspiring indicates his temperature is **elevated** (not normal), and the perspiration is his body's attempt to **decrease** (not maintain) his temperature by means of **evaporative** (not radiant, conductive, or convective) heat **loss** (not production).

Evaporative heat loss is the constant transfer of heat energy when a liquid becomes a gas. Water and heat loss occurs when moisture from the skin (perspiration, to cool the skin) and from the lungs (respiration) evaporates constantly, approximately 600 to 900 mL a day.

Factors Affecting Body Temperature

Age

During infancy, temperature regulation is unstable because of immature physiological mechanisms, which often continues to be the case until puberty. In older adults, the normal range lowers and a body temperature of 95eF is not unusual for some in cold weather, however, the average body temperature in older adults is 35eC-36.1eC (95eF-97eF). With aging, sensitivity to temperature extremes develops because of deteriorating control of the mechanisms, less subcutaneous tissue, and decreased metabolism.

GenderandHormone Levels

Women generally have greatervariations inbody temperature than men due to hormonalchanges during ovulation and menopause. These fluctuations during ovulation help predictfertility. During menopause, the hormonalchanges cause periods of intense heatandperspiration (called hotflashes). Also, as mentionedearlier, men have ahigherbasalmetabolic rate (BMR) than women due to the hormone testosterone.

Exercise

The needforincreasedbloodsupply to the muscles andcarbohydrate/fatbreakdown increases metabolism andtherefore heat production andbody temperature.

Circadian Rhythm andTime ofDay

Body temperature increasessteadily throughoutthe day from its lowestpointsometime inthe middle ofthe nightthroughout early morning to amaximum around1600. Then itbegins to decline backto the lowestpoint.

Stress

Hormonalandneuralstimulation causedby physicalandemotionalstress increases metabolism andtherefore increases heat production andbody temperature. An example ofthis wouldbe an increasedtemperature inaclientwho is anxious.

Environment

Warm andcoldenvironments impactthe body temperature ofaperson whose heat-loss mechanisms do notadequately regulate body temperature.

Routes ofTemperature Measurement

Temperatures can be taken atthe following sites: oral, rectal, tympanic membrane, temporalartery, esophageal, pulmonary artery, axillary, orurinary bladder.
Normalranges vary by site ofthe measurement. Forexample, the average oraltemperature foryoung adults is 37°C(98.6°F) whereas inolderadults the average core temperature is between35° and36.1 °C(95° to 97°F). Consistentuse ofone site of measurementallows forcomparison andmonitoring ofpatterns.

Hypothalmus Functionality

Alterations in temperature controlwillresultifthe hypothalamus orspinalcordis diseasedordamaged.

RelevantTemperature Measurements

These findings are normalforan olderadultatthis time ofday andatthese measurementsites.
Body temperature increasessteadily throughoutthe day from its lowestpointaround0600 to amaximum around1600. Normalranges vary by the site ofthe measurement. Inolderadults, the average core temperature is between 35° and36.1°C. The average oraltemperature range is 36° to 38°C. This normalcy is furtherverifiedby the proofthatthe client's circulation is adequate with warm skin andpinkmucous membranes.

ElevatedBody Temperature

Temperature elevations are frequently the sign ofillness. Temperatures exceeding 105degrees Fahrenheitalso have the potential to damage normalbody cells andtherefore intervention is often necessary. Obtaining asingle body temperature measurementis only one smallpiece ofthe puzzle anddoes notpresentthe whole picture. Itis importantto monitorbody temperature throughoutthe day atdifferenttimes andcompare these measurements to the client's baseline temperature atthose same times. Theterms pyrexia, febrile, andhyperthermiaare usedto describethe condition ofhaving above normalbody temperatures. Fever is actually abody defense. Elevatedbody temperature destroys invading bacteria. However, an elevatedbody temperature can

have negative effects on the body when the rise of body temperature accelerates beyond the body's ability to regulate it. Learn more below.

Negative Effects of Elevated Body Temperature

- During a fever, the body's metabolism increases as the body's thermoregulation mechanisms kick in. This increased metabolism results in additional oxygen requirements. If the body cannot meet this demand for more oxygen, cellular hypoxia occurs.
- Cellular hypoxia in the tissue of the heart (myocardium) = angina (chest pain)
- Cellular hypoxia in the tissue of the brain (cerebrum) = confusion
- Increased oxygen demands = increased respirations (to bring in more oxygen) = water loss (through respirations) = fluid volume deficit
- Increased body temperature = diaphoresis (sweating to cool the skin) = water loss = fluid volume deficit

Types of Elevated Body Temperature and Nursing Implications

Fever (Pyrexia) Exposure to someone with Influenza A

Fever is also known as a febrile episode.

Pathophysiology

- Mild fever up to 39eC (102.2eF) enhances the body's immune system.
- ↑ white blood cell (WBC) count = ↓ bacterial growth
- ↑ interferon = ↓ virus growth
- ↑ energy demands = ↑ metabolism = increased O2 demands = ↑ heart rate (HR) ↑ respiratory rate (RR)

Symptoms

- ≥ 38eC (100.4eF, adult or child)
- Chills, shivers, feels cold (body's attempt to release heat)
- Advanced fever: feels warm and dry, then the skin becomes warm and flushed (vasodilation) and diaphoresis occurs (evaporation to release heat)
- Hypoxia (due to increased O2 demands), diaphoresis, dehydration (due to fluid loss from diaphoresis and ↑ RR)
- Elevated WBC

Nursing Implications

- Stress caused by fever is particularly dangerous for clients with cardiac or respiratory issues (increased oxygen demands = hypoxia).
- Excessive diaphoresis and RR lead to fluid imbalance/dehydration.
- Fever reduction interventions are encouraged to help the body to release heat.

Hyperthermia Discovery of disease in the h

Pathophysiology

- Unlike fever, hyperthermia is caused by disease/trauma to the hypothalamus.
- Hyperthermia results in impairment of heat-loss mechanisms.
- The body can't promote heat loss or decrease the production of heat. Therefore, the temperature continues to increase.
- Recall that malignant hyperthermia is a genetic predisposition to uncontrolled production of heat after receiving certain anesthetics.

Symptoms

- Same as a fever

Nursing

Implications