

# Vital Signs – 2021

## Vital signs

- Temperature-T
- Pulse-P
- Respirations-R
- Blood Pressure-B/P.
- Pain as the 5<sup>th</sup> Vital Sign
- Oxygen Saturation (Pulse Ox or SpO2) measured @ same time

## Vitals Signs

- Pay attention to results
- Look at all values together
- Keep in mind the client's current and past health history
- What is normal for them?
- What is normal for the facility?

## Vital Signs Can:

- Identify an acute medical problem
- Quantify magnitude of illness & body's response to that stress
- Be a marker of chronic disease
- Reflect changes in body function that otherwise might not be observed

## When Do I Assess Vital Signs?

- Per facility policy
- Per healthcare provider order
- Other times
  - Baseline (admission)
  - Change in health status or reports symptoms
    - Chest pain, feeling "faint"
  - Before or after surgery or invasive procedure
  - Before or after meds or treatments
  - Before or after nursing interventions that could affect VS

## Blood Pressure

- Blood pressure is a measure of the pressure exerted by the blood as it flows thru the arteries
- Systolic pressure = Force of blood exerted against walls of arteries when ventricles contracting
- Diastolic Pressure = Force of blood exerted against walls of arteries when ventricles at rest
- Measured in millimeters of mercury (mmHg)
  - "Normal Adult" = less than 120/less than 80

## Factors Affecting Blood Pressure

- Age
- Exercise
- Stress
- Gender
- Ethnicity
- Medications
- Obesity/Diet

- Diurnal Rhythm
- Temperature
- Family history

## Complications

- Hypertension
  - BP persistently above normal
  - Present on two different occasions
  - Usually asymptomatic
- Hypotension
  - BP below expected range
  - SBP below 90 mmHg when normally higher
  - Can be symptomatic...or not
- Orthostatic Hypotension
  - BP drops with position change
    - Patient feels faint
    - Must change positions slowly
  - How to assess for this?
    - Obtain BP and HR in 3 different positions
    - Lie, Sit, Stand (in that order)
    - Drop in SBP > 20 mmHg or DBP > 10 mmHg with increase in HR by 10 – 20% = orthostatic hypotension

## Equipment for Checking Blood Pressure

- Stethoscope
- Blood pressure cuff
- Sphygmomanometer
  - Digital (automatic) manometer
    - Electronic readings
  - Aneroid (manual) manometer
    - Calibrated dial with needle that points to readings

## Equipment for Checking Blood Pressure

- Cuff Size
  - Bladder must be correct size
    - Width should be 40% of limb circumference
    - Bladder (inside the cuff) should wrap 80% around arm (or other limb) of adult

## Assessing the Blood Pressure

- Sites
  - Usually brachial artery
  - Forearm, thigh & calf if needed
- Contraindications
  - Injury/trauma (including surgery)
  - Cast
  - Mastectomy or surgical removal of lymph nodes
  - IV site/PICC line

- AV fistula

### Measuring B/P at Brachial Site

- Support patient's arm at heart level
- Expose arm completely—no BP's over clothing
- Wrap cuff smoothly, snugly around arm
- Place center of bladder over brachial artery where base of cuff 1" above antecubital space (bend in elbow)
- Palpate brachial pulse, place stethoscope over artery
- Close valve on inflating bulb & squeeze rapidly to inflate cuff until reads 30mmHg higher than "usual" SBP
- Release air screw valve slowly and allow dial to fall gradually (2-3 mmHg/sec.)
- Listen for Korotkoff's sounds-- sounds heard due to obliteration and return of arterial blood flow. Record:
  - First sound = systolic
  - Last sound = diastolic

### Korotkoff's Sounds

- Korotkoff's sounds are heard as blood begins to flow through artery
  - **Phase 1:** first faint clear tapping = systolic sound
  - **Phase 2:** Swishing, whooshing sound.
  - **Phase 3:** Crisper, more intense sound.
  - **Phase 4:** Distinct muffling sound.
  - **Phase 5:** Silence = diastolic sound
  - Continue to listen 10-20 mmHg below last sound to confirm your reading, then open cuff valve & completely deflate.

### Common Errors in Assessing BP

- Hurrying by the nurse
- Subconscious bias
- Improper size cuff, wrapped too loosely
- Arm not at heart level
- Assessing immediately after activity
- Failure to identify auscultatory gap
- Listening over clothes
  - Improper environment (noise, pt. talking)
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### Body Temperature

- Reflects balance between heat produced & heat lost from the body
- Measured in degrees
- Two kinds
  - Core Temperature (deep tissues)
    - Remains relatively constant
    - Normal is a range (97-99 F or 36-37.5 C--oral)
  - Surface Temperature (shell)
    - Skin, subcutaneous tissue
    - Rises & falls in response to environment

### Body Temperature

- Heat Balance

- Amount of heat produced=Amount of heat lost

### **Factors Affecting Heat Production**

- Basal Metabolic Rate (BMR)
- Muscle Activity
- Thyroxine output
- Testosterone
- Sympathetic stimulation/stress response

### **Factors Affecting Heat Loss**

- As body produces heat, it also loses it through:
  - Radiation
  - Conduction
  - Convection
  - Evaporation

### **Factors Affecting Body Temperature**

- Age
- Hormones
- Exercise
- Illness & Injury
- Food or fluid intake
- Smoking
- Circadian rhythms
- Stress
- Environment

### **Types of Thermometers (Equipment)**

- Electronic
  - Use disposable probe cover
  - Measures oral, rectal or axillary temps
  - Color coded probes
    - Red-rectal, blue-oral
  - <60 seconds
- Tympanic
  - Ear canal (tympanic membrane)
- Temporal
  - Compares temp of temporal artery to temp of room
  - Expensive

### **Procedures for Taking a Temperature**

- Oral
  - Advantages:
    - Accessible, convenient, relatively constant
  - Disadvantages:
    - Inaccurate after eating or smoking
  - Contraindicated:
    - Confused or agitated patients

- Facial trauma
  - Mouth Breathers
- Rectal
  - Advantages:
    - Reliable
  - Disadvantages:
    - Inconvenient, uncomfortable
  - Contraindicated:
    - Diarrhea, rectal disease or surgery
- Axillary
  - Advantages:
    - Safe, noninvasive, good option for confused/agitated
  - Disadvantages:
    - Less accurate?
  - Contraindicated: None known.
- Tympanic
  - Advantages:
    - Fast, accurate
  - Disadvantages:
    - Presence of cerumen may affect
    - Can be uncomfortable
  - Contraindicated:
    - Injury to ear canal
  -
- Temporal
  - Advantages:
    - Safe, fast, noninvasive
  - Disadvantages:
    - Adjustments needed if sweat on forehead
    - Expensive
  - Contraindications: None known

## Complications

- Fever
  - Normal range 97.0-99.0 F (36-37.5 C)
  - Temp above usual range = pyrexia or hyperthermia
  - Client with fever is “febrile”; without fever is “afebrile”
- Causes of elevated temperature
  - Pathogens (bacteria, fungi, virus)
  - Head injury (damage to hypothalamus)
  - Environmental exposures
    - Heat exhaustion & heat stroke

## Alterations in Body Temperature

## Hypothermia

- Core body temp below lower limit of normal
- Causes of depressed temperature
  - Excessive heat loss
  - Inadequate heat production to counteract loss
  - Impaired hypothalamic thermoregulation
  - May be accidental or induced

## Pulse

- Pulse = wave of blood created by contraction of heart's left ventricle
- Can be noted at various points on the body
- Peripheral pulse
  - Located away from heart
- Apical pulse
  - Central pulse located at apex of heart
  - Also called the point of maximal impulse (PMI)

## Assessing the Pulse

Rate: Number of beats per minute (bpm)

- For resting heart rate:
  - Adults: 60 to 100 bpm
  - Well-trained athletes; 40 to 60 bpm
- Bradycardia = HR less than 60
- Tachycardia = HR greater than 100

Rhythm: pattern of the beats

- Regular
- Irregular
  - Arrhythmia or dysrhythmia
- Check AP x 1 min

Pulse Strength (Amplitude)

- Volume of blood ejected with each heart contraction
- Ranges from absent to bounding
  - +0 Absent pulse
  - +1 Weak, thready
  - +2 Diminished
  - +3 Normal
  - +4 Bounding

Symmetry

- Compare on each side of body
  - If both the same, "bilaterally equal"

*Consider This:* Palpation of a peripheral pulse = presence of more proximal pulses

## Factors Affecting the Pulse

- Age

- Exercise
- Fever
- Medications
- Hypovolemia
- Stress/Pain
- Position change

### **Pulse Sites**

- Temporal
- Carotid
- Apical
- Brachial
- Radial
- Femoral
- Popliteal
- Posterior tibial
- Dorsalis pedis

### **Equipment for Checking the Pulse**

- Watch with second hand
- Stethoscope
- Doppler -- For difficult to detect pulses

## **Respirations**

- Body's mechanism for exchanging oxygen (O<sub>2</sub>) & carbon dioxide (CO<sub>2</sub>) b/t atmosphere and blood/cells of the body.
- Accomplished thru breathing
- Breathe in O<sub>2</sub>
- Breathe out CO<sub>2</sub>

### **Assessing Respirations**

- Assess when pt. relaxed and not aware
- Before assessment be aware of:
  - Normal breathing pattern
  - Medications, therapies, or conditions that may affect breathing

### **Assessing Respirations**

#### Rate

- Breaths per minute
- Normal = 12-20 per minute
  - 1 inspiration & 1 expiration = 1 breath
  - Slow-bradypnea
  - Fast-tachypnea
  - Absence-apnea

#### Depth

- Amount of chest wall expansion that occurs with each breath.
- Normal, deep, or shallow

## Rhythm

- Breathing intervals
  - Regular or irregular
- Normally are evenly spaced
- Infants less regular than adults

## Quality (Effort & Ease of Breathing)

- Unlabored or Labored?
- Quiet or noisy?
  - Labored or noisy breathing is abnormal
- Indications of labored breathing
  - Dyspnea
  - Orthopnea

## Assessing Respirations

- Goal of respirations?
- How do you know if respirations effective?

## Pulse Oximetry

- Noninvasive, indirect measurement of O<sub>2</sub> saturation (SpO<sub>2</sub>) of the blood
- Provides digital reading of pulse rate & SpO<sub>2</sub>
- Normal SpO<sub>2</sub> = 95-100%
  - Keep above 90% at a minimum, unless client has known underlying illness (i.e. COPD)

## Factors Affecting the Respiratory Rate

- Exercise
- Stress (crying, anxiety)
- Pain
- Smoking
- Body position
- Medications
- Higher altitude
- Anemia
- Sleep

## Factors Affecting SpO<sub>2</sub> (oxygen saturation)

- Low hemoglobin
- Circulation
- Activity
- Carbon monoxide
- Dark nail polish

## Recording & Reporting

- Document in client record on electronic medical record (EMR)

- Indicate appropriate route for temp, pulse, and BP
- Relate results to patient situation
- Conduct appropriate follow-up
  - Notify instructor first and then RN
  - Give medication or treatment as ordered
- Conduct appropriate follow-up based on interventions

