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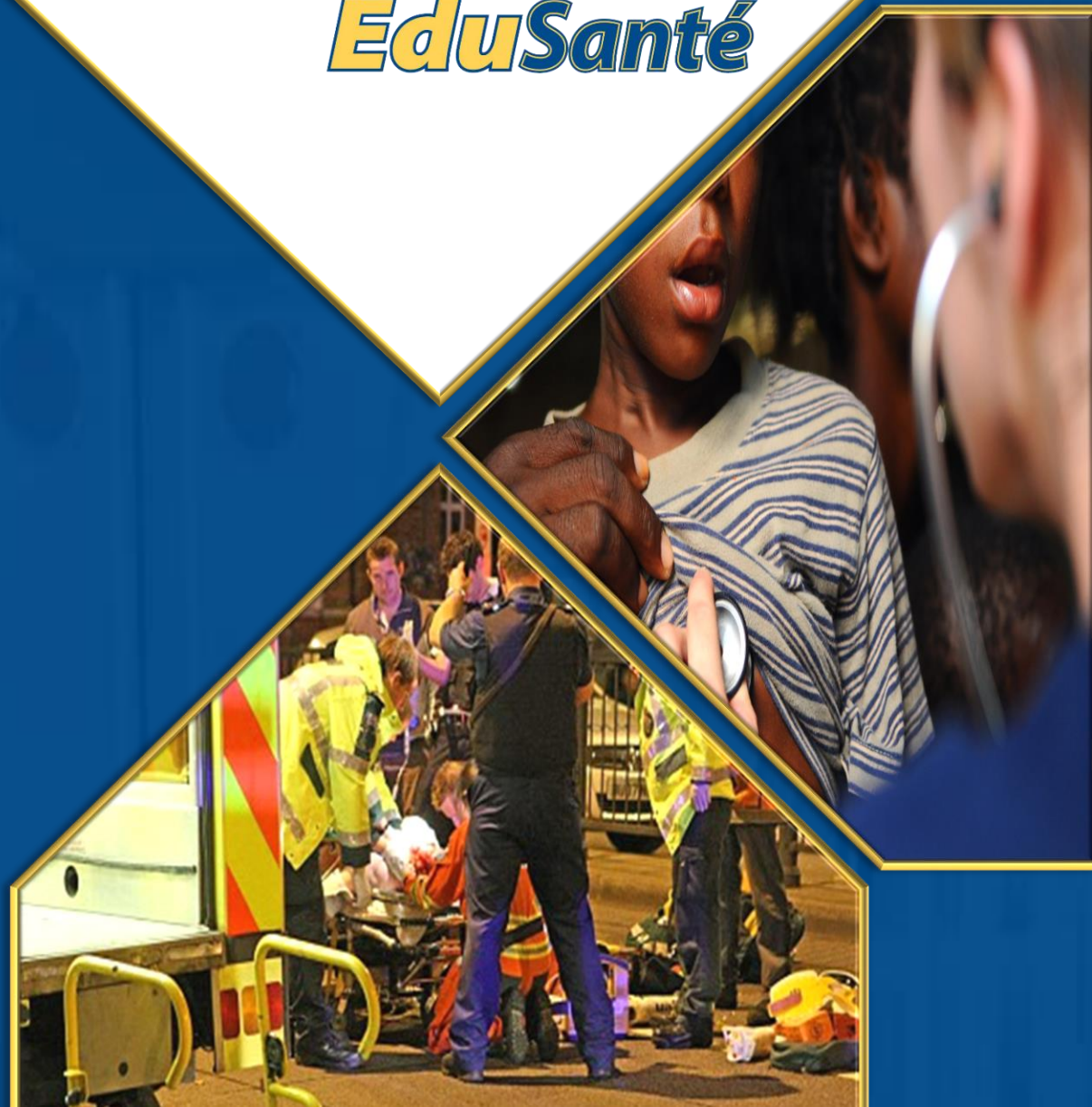
Vital Signs

Primary Care Paramedicine



Module: 09

Section: 03a

Vital Signs

- Vital signs are measurements of the body's most basic functions.
- These should be performed on all patients during our interaction with them
- Multiple sets of vitals allow for a clearer picture of the progression of the patients issue with the value of “trending their vitals”

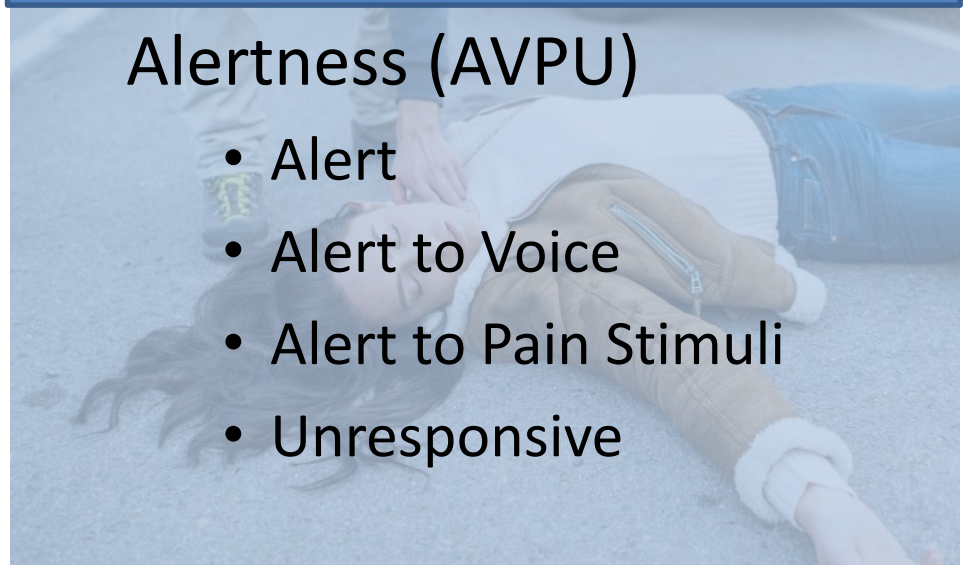
Vital Signs

- The vital signs include assessment of:
  - Level of Mentation
    - Awareness and Consciousness
  - Pulse rate
  - Respiratory rate
  - Blood pressure
  - Skin color and turgor
  - Pupils
  - Temperature
  - Pain
- They are considered the baseline indicators of a patient's health status.

Level of Mentation

- Used to assess the mentation and circulatory status of the patient
- Best assessment is to ask “can you tell me what happened?”

Level of Consciousness (LOC)



Alertness (AVPU)

- Alert
- Alert to Voice
- Alert to Pain Stimuli
- Unresponsive

Level of Awareness (LOA)

Orientation

- Person
- Place
- Time
- Event

Level of Mentation

- Examples of these descriptors:
  - Alert and orientated X 4 (A/O X 4)
  - Alert and orientated to person and place
  - Conscious but confused

Glasgow Coma Scale

- A neurological scale which aims to give a reliable and objective way of recording the conscious state of a person for initial as well as subsequent assessments.
- GCS was initially used to assess LOC after a head injury but is now commonly used in dealing with all acute medical and trauma patients.
- Patient receives a score of 3 – 15 and will be trended throughout their care
- Evaluates:
  - Eye response
  - Verbal response
  - Motor Response

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Glasgow Coma Scale

Eye Opening (E)	Verbal Response (V)	Motor Response (M)
4 (Spontaneous)	5 (Normal Conversation)	6 (Normal)
3 (To Voice)	4 (Disorientated)	5 (Localizes to pain)
2 (To Pain)	3 (Not coherent)	4 (Withdraws to pain)
1 (None)	2 (Only sounds)	3 (Decorticate)
	1 (None)	2 (Decerebrate)
		1 (None)

PEDIATRIC GLASGOW COMA SCALE (PGCS)				
	> 1 Year		**< 1 Year**	**Score**
EYE OPENING	Spontaneously		Spontaneously	4
	To verbal command		To shout	3
	To pain		To pain	2
	No response		No response	1
MOTOR RESPONSE	Obeys		Spontaneous	6
	Localizes pain		Localizes pain	5
	Flexion-withdrawal		Flexion-withdrawal	4
	Flexion-abnormal (decorticate rigidity)		Flexion-abnormal (decorticate rigidity)	3
	Extension (decerebrate rigidity)		Extension (decerebrate rigidity)	2
	No response		No response	1
	> 5 Years	**2-5 Years**	**0-23 months**	
VERBAL RESPONSE	Oriented	Appropriate words/phrases	Smiles/coos appropriately	5
	Disoriented/confused	Inappropriate words	Cries and is consolable	4
	Inappropriate words	Persistent cries and screams	Persistent inappropriate crying and/or screaming	3
	Incomprehensible sounds	Grunts	Grunts, agitated, and restless	2
	No response	No response	No response	1
TOTAL PEDIATRIC GLASGOW COMA SCORE (3-15):				

Pulse Rate

- Measure of mechanical output rate
- The arterial pulse results when the ventricular heart contraction pushes a pressure wave of blood throughout the arterial system.

Pulse Rate

- Best palpated over an artery close to the surface of the body that lies over bones
  - Carotid
  - Brachial
  - Radial
  - Femoral
  - Popliteal
  - Dorsalis pedis
  - Posterior tibial

Palpation of Arterial Pulses

A. Carotid
B. Brachial
C. Radial
D. Femoral
E. Popliteal
F. Dorsalis pedis
G. Posterior tibial

Pulse Rate

- To count the patients pulse:
  - Place two fingers at selected arterial point
  - Count pulse sensations for a period of 15 seconds and multiply by 4 (or a period of 30 seconds and multiply by 2)

Pulse Rate

- Rate
  - Average resting pulse rate in adults is 70 beats per minute and ranges between 60 and 100 beats per minute
  - In adults, tachycardia is a pulse rate that exceeds 100 beats per minute, and bradycardia is a pulse rate less than 60 beats per minute

Pulse Rate

Table 7-2 Normal Pulse Rate Ranges

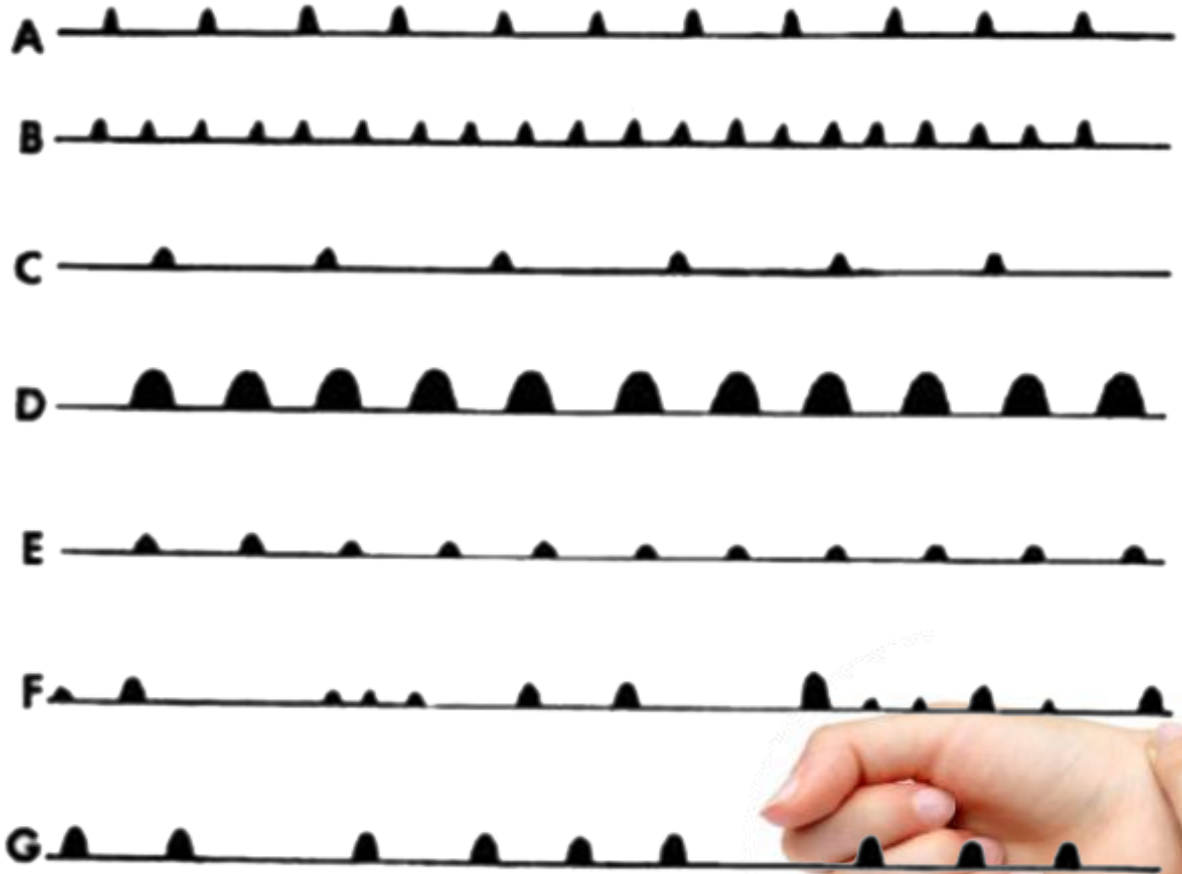
Age	Low Rate	High Rate
Newborn	100	180
Infant (< 1 year)	100	160
Toddler (1–2 years)	80	110
Preschooler (3–5 years)	70	110
School age (6–12 years)	65	110
Adolescent (13–18 years)	60	90
Adult (> 18 years)	60	100

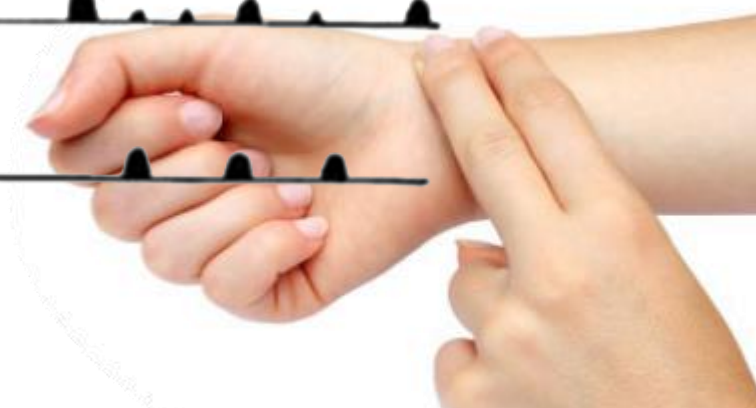
Pulse Rate

- Rhythm
  - Note the rhythm
    - Should be regular
    - If an irregular rhythm is detected, count for a full 60 seconds
- Quality
  - Note the amplitude (force) of each pulsation

Pulse Rate

A. Regular
B. Tachycardia
C. Bradycardia
D. Bounding
E. Weak (thready)
F. Irregular
G. Intermittent (irregular)





Respiratory Rate

- Measure of inspiration and expiration
- Evaluating:
  - Rate (Fast, slow)
  - Depth (Shallow, deep)
  - Rhythm (Regular or irregular)
  - Sounds (Clear, stridor, wheezing, etc)

Respiratory Rate

- Assess the respiratory rate by inspecting the rise and fall of the chest.
- Count the number of breaths (inspiration and expiration) that occur in 1 minute
  - 30 seconds and multiply by 2
- Tachypnea is a faster than normal respiratory rate.
- Bradypnea is a slower than normal respiratory rate.

Respiratory Rate

Table 7-1 Respiratory Rates

Age	Low Rate	High Rate
Newborn	30	60
Infant (< 1 year)	30	60
Toddler (1–2 years)	24	40
Preschooler (3–5 years)	22	34
School age (6–12 years)	18	30
Adolescent (13–18 years)	12	26
Adult (> 18 years)	12	20

Blood Pressure

- Peripheral measurement of cardiovascular function
- Arterial blood pressure is the force of the blood against the wall of an artery as the ventricles of the heart contract and relax.
- Measured in mmHg
- Expressed as a fraction (Systolic/Diastolic)
- Can be assessed by either:
  - Auscultation
  - Palpation
  - Non-Invasive

Systolic Pressure

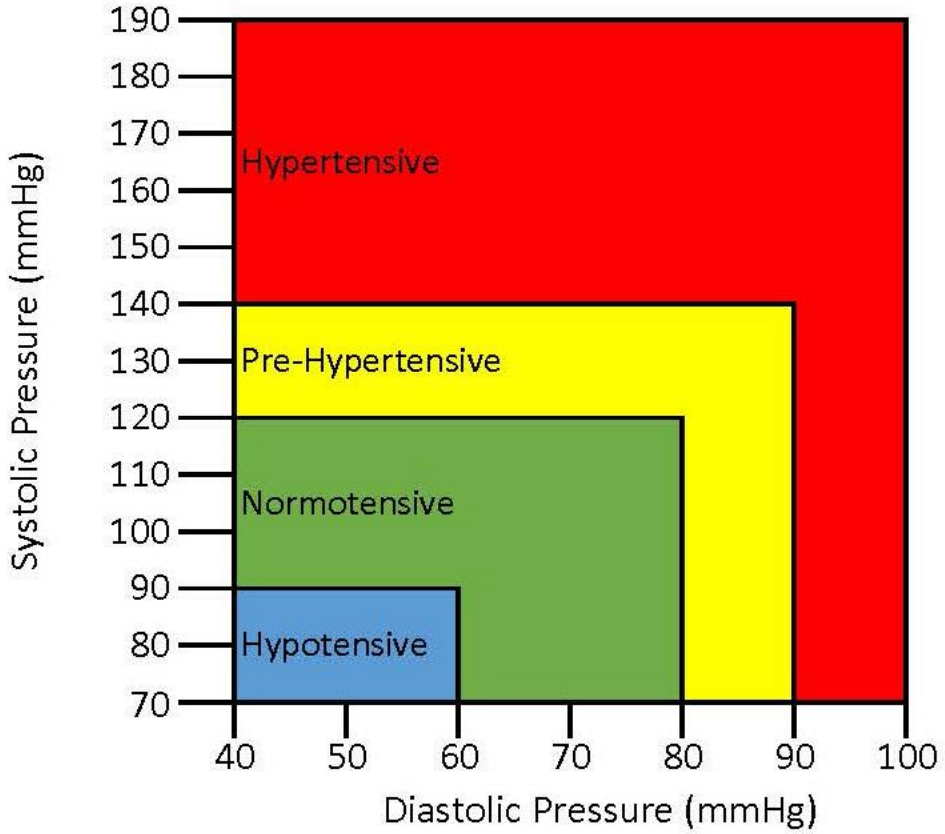
- Systolic pressure, the force exerted when the ventricles contract, is largely the result of:
  - Cardiac output
  - Blood volume
  - Compliance of the arteries
- Blood pressure is highest during systole.

Diastolic Pressure

- Diastolic pressure is the force exerted by peripheral vascular resistance when the heart is in the filling or relaxed state.
- Blood pressure falls to the lowest point during diastole.

Blood Pressure

- Average: 120/80 mmHg
  - Hypertension*
    - Blood pressure higher than normal
    - A relative amount but usually >140/90
  - Hypotension*
    - Blood pressure lower than normal
    - Based on patient's normal BP status

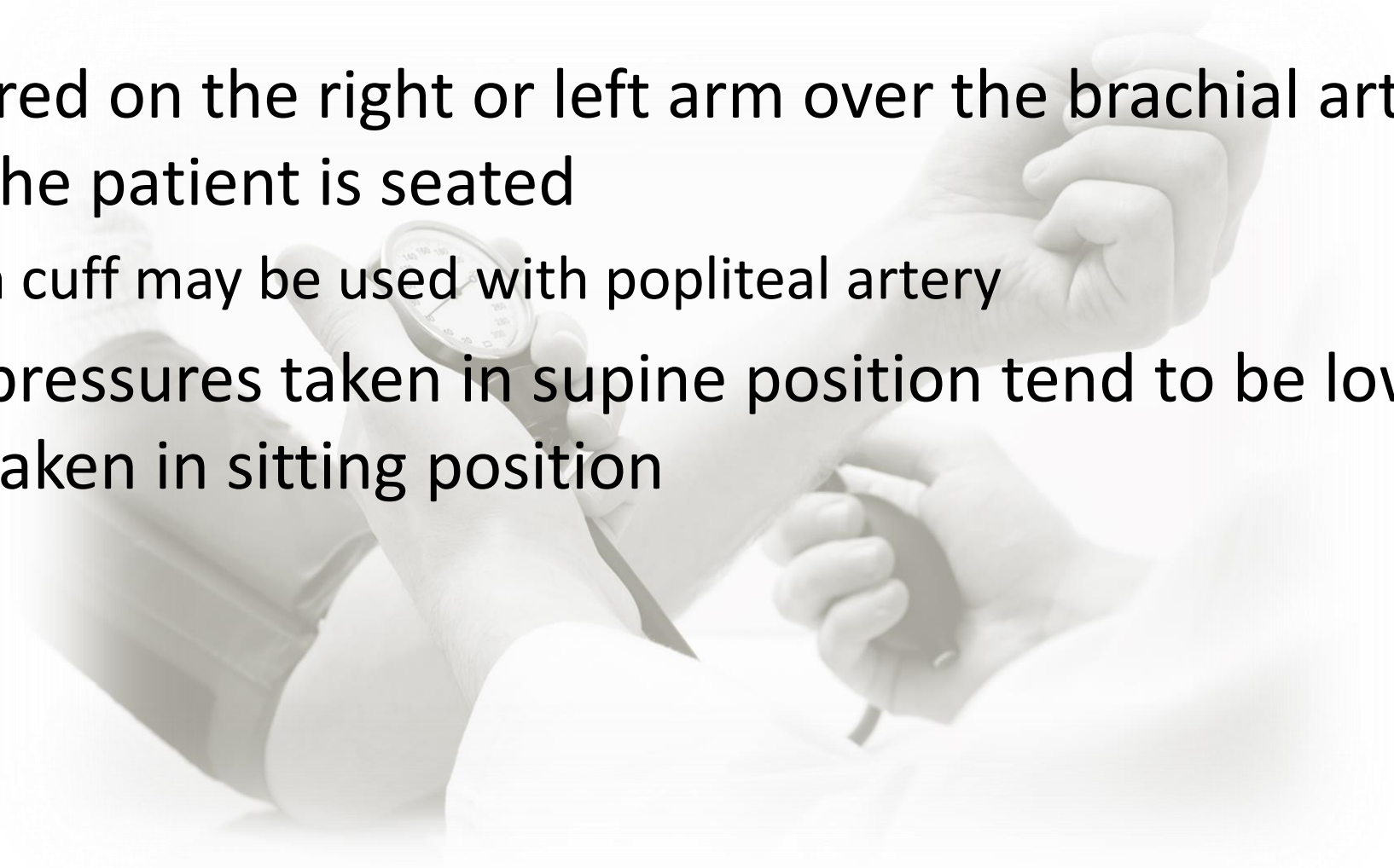


* Numbers are less important than assessment of trends and end-organ perfusion

Pulse Pressure

- The pulse pressure is the difference between the systolic and diastolic pressures.
- For example:
  - If the blood pressure were 120/80 mmHg, the pulse pressure would be 40 mmHg
- Medical conditions may cause a widening or narrowing of the pulse pressure
  - An increase in pulse pressure is indicative of widening
  - A decrease in pulse pressure is indicative of narrowing

Blood Pressure



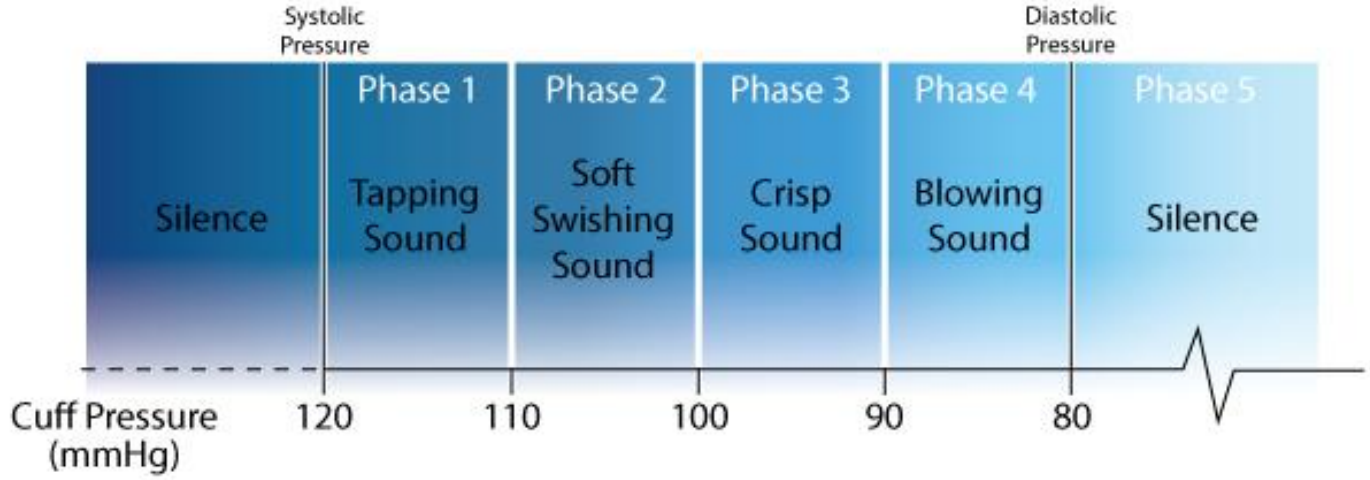
- Measured on the right or left arm over the brachial artery when the patient is seated
  - Thigh cuff may be used with popliteal artery
- Blood pressures taken in supine position tend to be lower than those taken in sitting position

Palpated Blood Pressure

- Apply cuff to right or left arm
- Place two fingers on pulse point
- Inflate cuff above the point of pulse occlusion
- Deflate cuff and mark the pressure when the pulse returns
- This determines the systolic pressure only

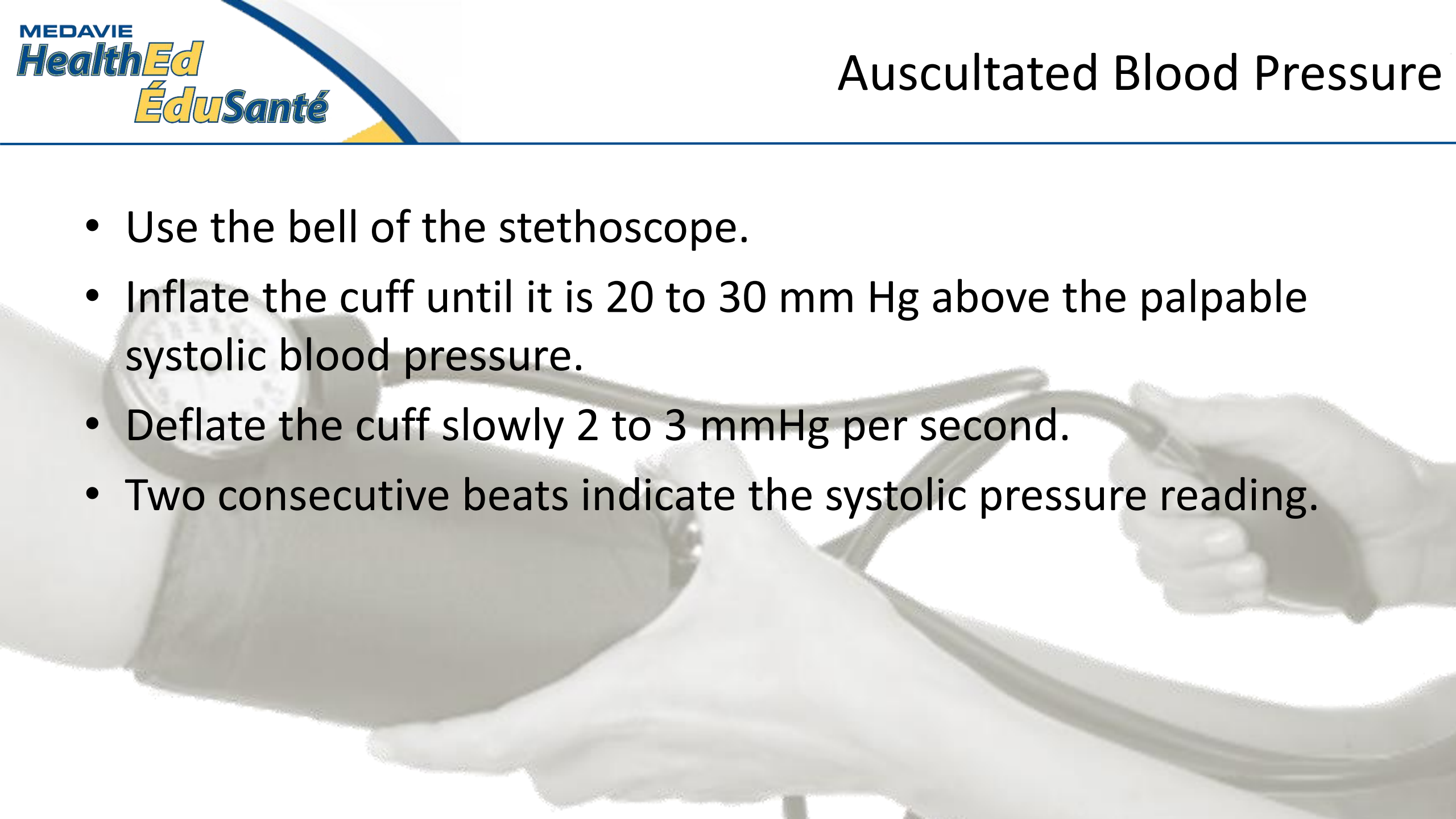
Auscultated Blood Pressure

- Korotkoff sounds: the low-pitched sounds produced by the turbulence of blood flow in the artery
- Auscultatory gap
  - Korotkoff sounds heard, may disappear, and reappear 10 to 15 mm Hg below the systolic pressure reading



Auscultated Blood Pressure

- Use the bell of the stethoscope.
- Inflate the cuff until it is 20 to 30 mm Hg above the palpable systolic blood pressure.
- Deflate the cuff slowly 2 to 3 mmHg per second.
- Two consecutive beats indicate the systolic pressure reading.



Auscultated Blood Pressure

- Note the point at which the initial crisp sounds become muffled: this is the first diastolic sound.
- Note the point at which the sounds disappear: this is the second diastolic sound.
- The two blood pressure readings recorded are the first systolic and the second diastolic sounds (e.g. 110/68).
- Repeat the process in the other arm
  - May vary by as much as 5 to 10 mmHg

Blood Pressure

Palpation

Auscultation

80-70-60 Guideline

- Helps make a rough estimate of the patients systolic BP in adults
- Groups pulse points that if present usually signify a corresponding systolic of at least 80, 70 or 60 mmHg
  - Radial and Dorsalis Pedis/Posterior Tibialis (80)
  - Brachial and Popliteal (70)
  - Carotid and Femoral (60)

Skin

- Evaluate
  - Color
  - Temperature
  - Moisture
  - Mobility and turgor

Skin

Pupils

- Size
  - Both pupils should be equal
  - Average size is 2 – 5 mm in diameter
- Symmetry
  - Both pupils should be round (abnormal shapes could indicate cerebral damage)
- Reactivity
  - Pupils should react briskly to the addition and removal of light

Pupils

- Dilated or Unresponsive
  - Cardiac Arrest, CNS Injury, Hypoxia or anoxia, drug use (LSD, atropine, amphetamines, barbiturates)
  - Lack of Light
- Constricted or Unresponsive
  - CNS Injury or disease, narcotic use, eye medications
  - Bright Light
- Unequal
  - CVA, head injury, direct trauma to the eye, eye medications
  - 2 – 3 % of population normally have unequal pupils
  - Prosthetics

Assessing Pupils

- Look into each of the patient's eyes, examining the size of the pupils.
  - If available use the scale printed on the neurological assessment chart as a comparison.
  - Compare the sizes of the pupils.
- Note the shape of each pupil.
  - Compare the shapes of the pupils.
- After providing prior warning to the patient, move the torchlight from the side of the head towards the pupil and note any change in pupil size and the speed of the reaction (brisk or sluggish).
- Repeat the above procedure in the opposite eye.

Pupils

- Accommodation
  - A reflex action of the eye, in response to focusing on a near object, then looking at distant object (and vice versa), comprising coordinated changes in vergence, lens shape and pupil size.
- Pupil assessment should be documented as found
  - Examples
    - PEARL (Pupils Equal And Reactive to Light)
    - PERRLA (Pupils Equal Round Reactive to Light and Accommodating)

Temperature

- Provides an important clue to the severity of a patient's illness
- Normal: 37°C (98.6°F)
- Routes
  - Oral
  - Rectal
  - Axillary
  - Tympanic
  - Forehead

Pain

- Pain is a common, uncomfortable sensation and emotional experience associated with actual or potential tissue damage.
- Acute pain is sudden, of short duration, and usually associated with surgery, injury, or acute illness.
- Chronic pain is persistent, lasting weeks or months or longer, and usually associated with prolonged disease.

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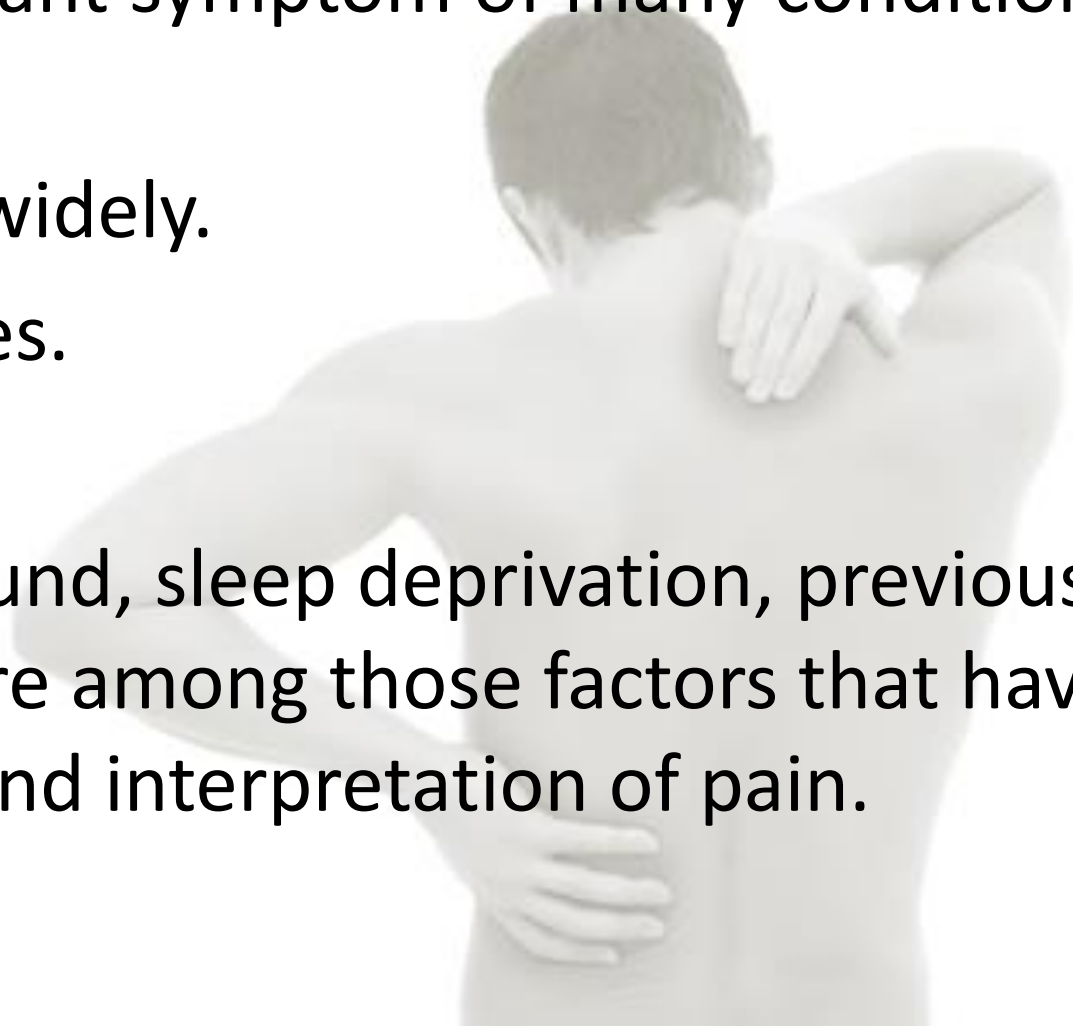
Responses to Pain

- Pain is a subjective unpleasant symptom of many conditions and injuries.
- Individual response varies widely.
- Threshold of response varies.
- Tolerance level varies.
- Emotions, cultural background, sleep deprivation, previous pain experience, and age are among those factors that have an impact on the perception and interpretation of pain.



Pain Assessment

- When the chief complaint is pain, the location and related symptoms may assist in the diagnosis of a patient's condition.
- If the pain is related to a diagnosed condition (e.g., trauma, surgery, sickle cell anemia, or cancer), assessment of its character and intensity is necessary for pain control.
- Remember that there may be more than one cause of pain.

Self-Report Pain Rating Scales

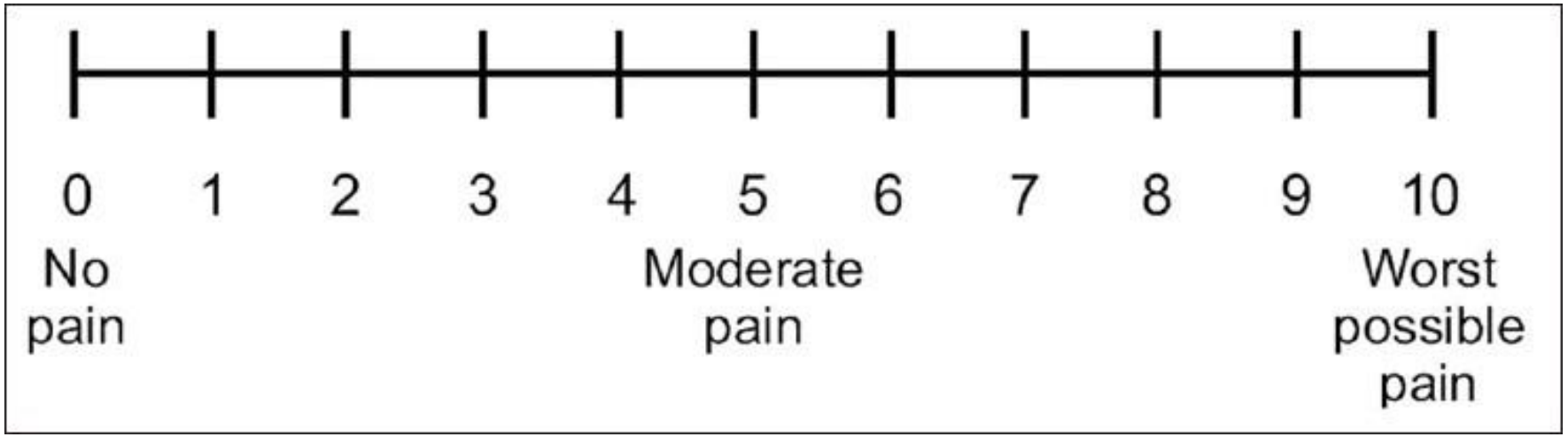
- A variety of scales and instruments have been developed.
- Very few include patient's emotional response.
- Learn patient's customary terminology.
- Consistent use of a particular scale will contribute to consistent interpretation.

Self-Report Pain Rating Scales

- Pain intensity may vary in different sites.
- Pain intensity may vary with routine activities such as moving, coughing, or deep breathing.
- Link pain intensity reported with location and activity.
- Reassess regularly, even after problem is solved.

Self-Report Pain Rating Scales

- 10 point scale
- “On a scale of 0 to 10, with 10 being the worst pain you have every felt, how would you describe your pain?”



Self-Report Pain Rating Scales

- Self assessment scale used for pain assessment only.
  - Patient needs to be able to understand the instructions and select a face that illustrates the pain they are experiencing.
  - It should never be used with unresponsive patients or to compare the patient's face to the scale to determine the level of pain.

Assessing Pain Behaviors

- Guarded, protective behavior, hands over painful area, distorted posture, irritability
- Facial mask of pain: distorted expression
- Vocalizations: groaning, crying, or talkative patient becomes quiet
- Body movements such as head rocking, pacing, inability to keep hands still

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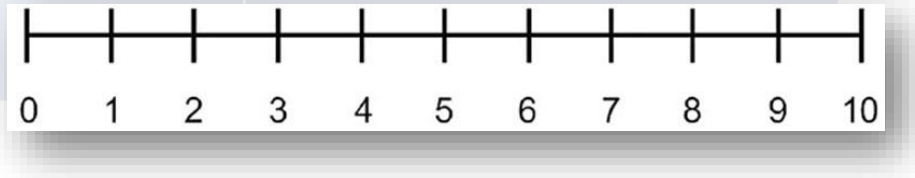
Assessing Pain Behaviors

Scale	Descriptive	Activity Tolerance Scale
• No Pain (0 – 1)	• Alert • Smiling	• No pain
• Mild Pain (1 – 2)	• No Humour • Serious, Flat Affect	• Can be ignored
• Moderate Pain (2 – 4)	• Furrowed brow • Pursed Lips • Breath holding	• Interferes with tasks
• Severe Pain (5 – 6)	• Wrinkled nose • Raised upper lip • Rapid breathing	• Interferes with concentration
• Very Severe Pain (6 – 8)	• Slow blink • Open mouth	• Interferes with basic needs
• Excruciating Pain (8 – 10)	• Eyes closed • Moaning • Crying	• Bed rest required



Assessing Pain Behaviors

- Changes in vital signs
- Pallor and diaphoresis
- Pupil dilation
- Dry mouth
- Decreased attention span, greater confusion

Pediatrics

- Pain Assessment Scale for pediatrics can vary depending on age:
  - FLACC (Face, Legs, Cry, Consolability) for 0 – 3 y/o
  - Wong-Baker Faces Pain Scale for 4 – 12 y/o

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FLACC Scale

	0	1	2
FACE	No particular expression or smile, **eye contact and interest in surroundings**	Occasional grimace or frown, withdrawn, disinterested, **worried look to face, eyebrows lowered, eyes partially closed, cheeks raised, mouth pursed**	Frequent to constant frown, clenched jaw, quivering chin, **deep furrows on forehead, eyes closed, mouth opened, deep lines around nose/lips**
LEGS	Normal position or relaxed	Uneasy, restless, tense, **increased tone, rigidity, intermittent flexion/ extension of limbs**	Kicking or legs drawn up, **hypertonicity, exaggerated flexion/ extension of limbs, tremors**
ACTIVITY	Lying quietly, normal position, moves easily **and freely**	Squirming, shifting back and forth, tense, **hesitant to move, guarding, pressure on body part**	Arched, rigid, or jerking, **fixed position, rocking, side to side head movement, rubbing of body part**
CRY	No cry or **moan** (awake or asleep)	Moans or whimpers, **occasional cries, sighs,** occasional complaint	Crying steadily, screams, sobs, moans, **grunts**, frequent complaints
CONSOLABILITY	**Calm**, content, relaxed, does not require consoling	Reassured by occasional touching, hugging, or talking to, distractible	Difficult to console or comfort

Older Adults

- No evidence exists that older adults have a diminished perception of pain.
- Many do have chronic health conditions associated with pain.
- They may not report pain for several reasons:
  - Believe it to be a normal part of aging
  - Do not want to be a nuisance
  - Believe reporting pain will lead to expensive testing or hospitalization
  - Hesitant to take pain medications

Diagnostics

- Diagnostics are used to help identify a disease, illness, or problem
- Some of the more common diagnostics are mistakenly considered vital signs
- Examples of these would be:
  - Pulse oximetry
  - ECG
  - Blood glucose levels (BGL)
  - End-tidal CO_2