

Vital Signs and Pain Scale:

Five Components of Vital Signs:

1. Temperature: Normal Ranges (36.5°– 37.2°C or 97.8° – 99°F)
2. Pulse Rate: 60-100/min
3. Respirations Rate: 12-20/min
4. Blood Pressure: 120/80 mmHg
5. Pain Assessment: Numerical, Descriptive & Visual

Temperature:

Orally: 37°C	Tympanic: 37°C
Rectally: 37.5°C	Skin: 37°C
Axillary: 36.5°C	

Healthy individual body temperature deviates from 36.5-37.2° C. Cells, tissues and organs function best at these temperatures. Normal body temperature is 37° C or 98.6°F. The bodies temperature is regulated by the *anterior hypothalamus* (protecting from hyperthermia) and *posterior hypothalamus* (protecting from hypothermia).

Factors Influencing Body Temperature:

Hypothermia (< 95°F): decrease metabolic rate, inadequate clothing, cold environment, drug / alcohol consumption, inactivity, aging.

Hyperthermia (>100°F): increase metabolic rate, inappropriate clothing, hot environment, inability to perspire, medications, infectious process, exercise.

Increased body metabolism and metabolic activity accompany elevations in body temperature and may be as high as 10 –13 percent for each 1°C. Increased metabolic demand results in a increase in oxygen consumption.

Pulse and respirations: increase in pulse 10-15 beats/min. with each 1°C. Respiratory rate is increased due to the increase in oxygen demand.

Pulse:

Infant: 120-160/min	Toddler: 90-140/min	Adult: 60-100/min
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To calculate **Maximum Heart Rate**: $220 - \text{age} = \underline{\hspace{2cm}}$ (Ex: $220 - 26 = 194$)

Pulse sites: Temporal, Carotid, Brachial, Radial, femoral and Apical (for infants).

Pulse rate: count for 15 seconds and multiply by 4. When pulse feels irregular, take for entire minute.

Pulse assessment: When taking a pulse, use the first and second fingertips of one hand, press firmly but gently on the arteries until you feel a pulse.

The quality of arterial pulsation indicates cardiac workload and cardiac efficiency. (Assessment of Peripheral Vascular Resistance)

Quality of the pulse is assessed and may be noted on a point scale:

- 3+ - bounding – increase stroke volume
- 2+ - normal
- 1+ - weak thready – decrease stroke volume
- O – absences

Tachycardia: > 100/min (adult)

Bradycardia: < 60/min (adult)

Factors Influencing Pulse Rate:

	Increase	Decrease
Exercise	short-term	trained athletes
Temperature	fever & heat	hypothermia
Emotions	pain, anxiety	severe pain
Drugs	+ chronotropic (epi)	- chronotropic (digitalis)
Hemorrhage	loss of blood	

Respirations:

New Born: 35-40/min	Child: 20-30/min	Adult: 12-20/min
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Factors Influencing Respiratory Rate:

	Increase	Decrease
Exercise	rate & depth	
Acute pain	rate & depth	
Anxiety	rate & depth	
Smoking	rate	
Narcotic		rate & depth

Tachypnea: increased respiratory rate. > 24/min.

Bradypnea: < 10/min. (depression of respiratory center – drugs, brain injury)

Apnea: total cessation of breathing (RR = 0)

Dyspnea: difficult, labored, or painful breathing (air hungry), rapid, shallow breathing -pain, SOB, Hypoxemia

Blood Pressure:

Arterial blood pressure is an important parameter of the cardiovascular system and the status of fluid balance. Blood pressure has two components: systolic and diastolic.

Systolic pressure: the max pressure exerted on the arteries with the left ventricular systole.

Diastolic pressure: the elastic recoil pressure constantly present on the arterial walls.

Pulse pressure: the difference between the systolic and diastolic pressure.

Mean Blood Pressure = Diastolic + $\frac{1}{3}$ (Pulse Pressure)

Blood pressure is a product of the cardiac output (Stroke Volume x Heart Rate) times the impedance to blood flow through the vessels, or peripheral vascular resistance. Factors that increase either the cardiac output or the vascular resistance will increase pressure.

Normal BP:

Age	Blood Pressure (mmHg)	
New Born	40 (mean)	<i>Minimum systolic blood pressure (SBP) = 70 mmHg + (2 x age in years)</i>
1 year	95/65	
6 year	105/65	
14-17 yrs	120/75	
Adult	120/80	

Classification of BP:*

	Systolic (mmHg)	Diastolic (mmHg)
Normal	< 120	< 80
Elevated	120 -129	< 80
Hypertension, Stage 1	130 - 139	80 - 89
Hypertension, Stage 2	\geq 140	\geq 90

**2017 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: American College of Cardiology/American Heart Association Task Force on Clinical Practice Guideline.*

Orthostatic Hypotension: fall in systolic BP 25 mmHg and 10 mmHg accompanied by sign and symptoms.

Factors Influencing Blood Pressure:

	Increase	Decrease
Pain	X	
Sepsis		X
Anxiety	X	
Smoking	X	
Narcotics		X
Blood Loss		X

Contraindications:

- a. If the arm has intravenous fluid infusing.
- b. Arm injured or diseased
- c. Same side of radical mastectomy
- d. Arm has a shunt / fistula for renal dialysis

Errors in BP Measurements:

High Readings:

- Inappropriate cuff size.
- Wrapping cuff too loosely
- After meals, smoking, bladder distended.
- Deflating the cuff to slowly.

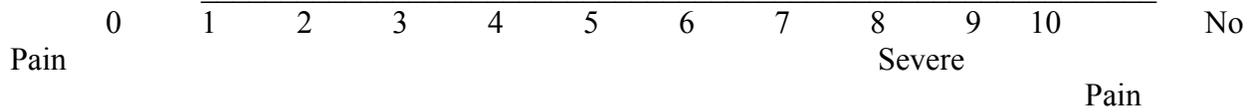
Low Readings:

- Arm above level of heart.
- Failure to notice an auscultatory gap.
- Inability to hear sounds.

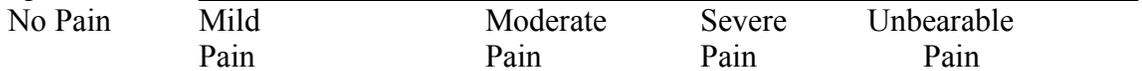
Pain Scale: 3 Types

Pain is subject to an individual’s interpretation. Pain scale assessment allows the medical team to comfort and meet the needs of the individual. The individual reads the scale and chooses a word to describe the intensity of their pain. After identifying the level of pain rating that is comfortable for the individual, the medical team will ensure the pain management is effective. Two ways to manage pain: Drug therapy and Non-drug techniques (Slow Rhythmic Breathing).

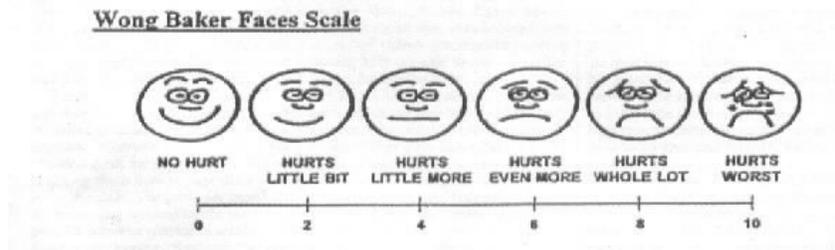
1. Numerical



2. Descriptive



3. Visual (Nonverbal and Children)



Pulse Oximeter:

Pulse oximetry is a test used to measure the oxygen level (oxygen saturation) of the blood. It is an easy, painless measure of how well oxygen is being sent to parts of the body.

Normal Readings: $\geq 94\%$

COPD patient’s normal readings: 88 to 92%

Hypoxemia: below-normal blood oxygen level

Signs of Hypoxemia: SOB, chest pain, confusion, headache, rapid pulse.

Reference:

Potter Perry: Fundamentals of Nursing, Chapter 32: *Vital Signs*; Fourth edition, Mosby 1997.

American College of Cardiology: 2017 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults.