

Topic :-



Pulse

Nursing Foundation -I

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Pulse

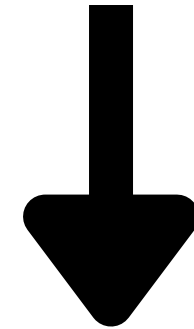
The pulse is the rhythmic expansion and recoil of an artery due to the wave of blood caused by the

contraction of the left
ventricle of the heart, which
can be felt at various arterial
sites in the body.

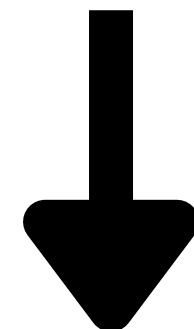
Physiology and Regulations

Physiology

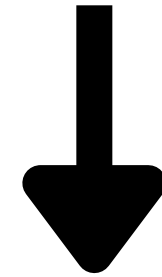
Left Ventricle Contracts



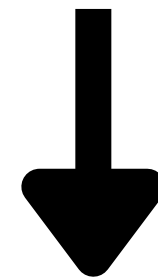
Blood ejected into Aorta



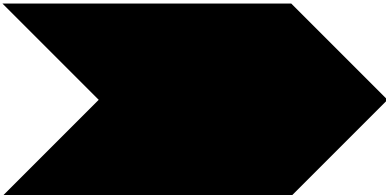
Pressure wave travels along arteries



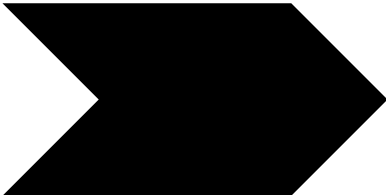
Expansion & recoil of arterial wall



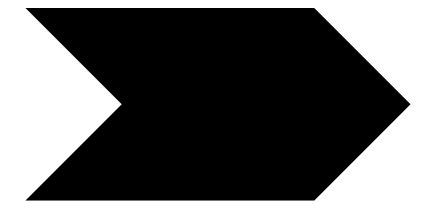
Palpable Pulse



Pulse is produced by the left ventricular contraction (systole).



When the ventricle contracts, blood is ejected into the aorta.



This creates a pressure wave that travels along the arteries.



The wave causes expansion and recoil of arterial walls →
felt as pulse.



Each pulse corresponds to
one heartbeat.

Regulations

(1). Autonomic Nervous System

(ANS) :-

- **Sympathetic -**

↑ heart rate & pulse (tachycardia).

- **Parasympathetic (vagus nerve) -**

↓ heart rate & pulse (bradycardia).

(2). Cardiac Centres (Medulla Oblongata) :-

- **Cardioacceleratory centre -**
increases pulse.
- **Cardioinhibitory centre -**
decreases pulse.

(3). Baroreceptors (in carotid sinus, aortic arch) :-

Sense blood pressure changes
and adjust pulse.

(4). Chemoreceptors (carotid & aortic bodies) :-

Respond to changes in O_2 , CO_2 ,
and pH $\rightarrow$ regulate pulse.

(5). Hormones :-

**Adrenaline, noradrenaline,
thyroxine → increase pulse rate.**

(6). Others Factors :-

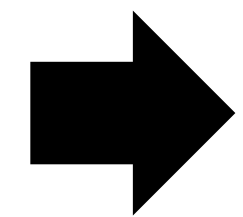
Age, exercise, temperature,
emotions, posture, drugs, and
diseases.

Characteristics

(1). Rate

➡ Number of beats per minute.

➡ **Normal adult :- 60–100 bpm.**



Variations :-



Tachycardia (>100 bpm).



Bradycardia (<60 bpm).

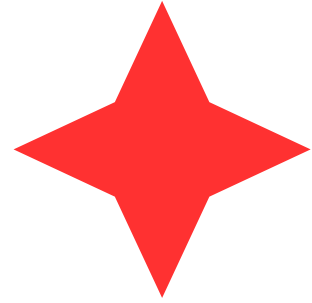
(2). Rhythm

- ➡ Pattern of beats and intervals.
- ➡ **Regular** :- beats evenly spaced.
- ➡ **Irregular** :- uneven beats (arrhythmia).

(3). Volume (Amplitude/ Strength)

➡ Force of blood flow in the artery.

➡ Described as :-



Bounding (strong)



Normal

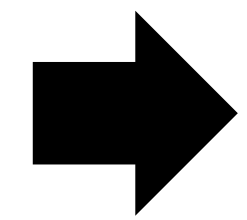


Weak/Thready

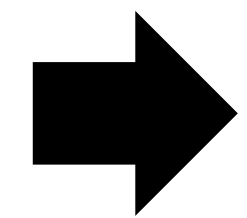
(4). Tension

➡ Resistance felt when compressing the artery.

➡ **Normal** :- moderate pressure obliterates pulse.



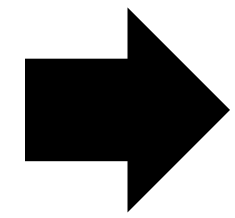
High tension :- seen in
hypertension.



Low tension :- seen in
shock/collapse.

(5). Equality

- ➡ Comparison between pulses on both sides of the body.
- ➡ Normally equal in strength and rate.



Inequality may suggest
circulatory obstruction
or arterial disease.

(6). Condition of Arterial Wall

➡ Normally artery feels elastic.

➡ Hard or rigid wall → suggests
arteriosclerosis.

Factor

affecting Pulse

(1). Age

➡ **Infants :-** Fast pulse (120–160 bpm).

➡ **Adults :-** Slower (60–100 bpm).

➡ **Elderly :-** Slightly slower.

(2). Gender

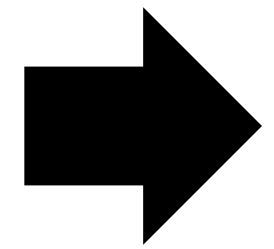
➡ Women usually have a slightly faster pulse than men.

(3). Exercise / Activity

➡ Increases pulse during activity.

➡ Trained athletes may have a
lower resting pulse.

(4). Emotions / Stress



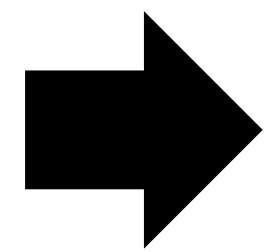
Anxiety, fear, pain → increase
pulse.

(5). Body Temperature

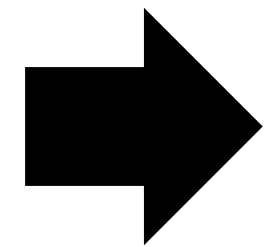
➡ Fever/heat :- Increases pulse.

➡ Hypothermia/cold :- Decreases
pulse.

(6). Medications

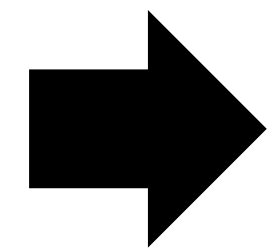


Stimulants (e.g., caffeine, adrenaline) ↑ pulse.



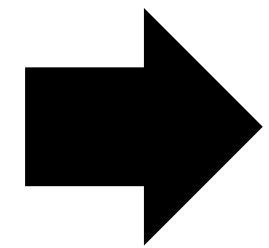
Depressants (e.g., beta-blockers, digoxin) ↓ pulse.

(7). Posture / Position Changes



Sudden standing may increase
pulse temporarily.

(8). Blood Loss / Shock

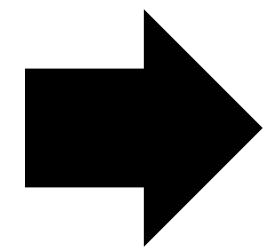


Rapid, weak, thready pulse.

(9). Diseases / Conditions

➡ Heart disease, infection, thyroid disorders, dehydration → affect pulse.

(10). Physical Fitness



Well-trained persons → lower
resting pulse due to stronger
heart.

**Sites of
assessing pulse**

● Peripheral sites

★ Radial (most common)

★ Brachial

★ Carotid



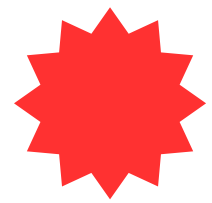
Temporal



Dorsalis
pedis



Femoral



Popliteal



Posterior tibial

● Central sites

★ Apical pulse :- over the apex of the heart (5th intercostal space, midclavicular line).

Equipments

★ Fingers (index and middle fingers,
not thumb).

★ Stethoscope (for apical pulse).

★ Watch/clock with second hand.

Procedure / Technique

(1). Prepare

- ➡ Wash hands, explain procedure to patient.
- ➡ Ensure patient is relaxed and at rest.

(2). Palpation

- ➡ Place index and middle fingers over the artery.
- ➡ Apply gentle pressure until pulse is felt.

(3). Counting

- ➡ Count beats for 30 seconds and multiply by 2 if regular.
- ➡ Count for full 60 sec if irregular or if patient has cardiac condition.

(4). Apical Pulse (if required)

➡ Place stethoscope at apex of heart.

➡ Count for 1 full minute.

(5). Observe Characteristics

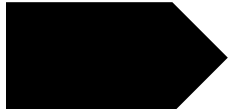
- ➡ Rate(number of beats/minute).
- ➡ Rhythm (regular/irregular).
- ➡ Volume/Amplitude (strong, weak, thready, bounding).

➡ Tension (compressibility).

➡ Equality (compare both sides).

➡ Condition of arterial wall.

(6). Record & Report

 Document findings clearly.

 Report abnormalities
immediately.

Normal Pulse Rates



Newborn :- 120–160 bpm



Child :- 80–120 bpm



Adult :- 60–100 bpm



Athletes :- 50–60 bpm

Alterations in pulse

(1). According to Rate

➡ **Tachycardia :-** Pulse rate
above 100
bpm in adults.

Causes :- fever, pain, anxiety, shock,
anaemia, hyperthyroidism.

➡ **Bradycardia :-** Pulse rate
below 60
bpm in adults.

Causes :- sleep, athletes, drugs (e.g.,
digoxin, beta-blockers),
raised intracranial pressure.

(2). According to Rhythm

➡ **Regular pulse :-** Evenly spaced beats.

➡ **Irregular pulse
(Arrhythmia/Dysrhythmia) :-**

Uneven spacing of beats.

Causes :- cardiac disorders,
electrolyte imbalance,
digitalis toxicity.

(3). According to Volume (Amplitude/Strength)

➡ **Normal pulse :-** Easily felt,
moderate
pressure.

Weak/Thready pulse :-

Faint, difficult to palpate.

Causes :- shock, haemorrhage,
dehydration.

➡ **Bounding pulse :-** Strong,
forceful.

Causes :- fever, hypertension,
anxiety, aortic
regurgitation.

(4). According to Tension

➡ **High tension pulse :-**

Hard to compress, seen in
hypertension.



Low tension pulse :-

Easily compressed, seen in
shock/collapse.

(5). According to Equality

➡ **Unequal pulse :-** Difference between right and left sides.

Causes :- arterial obstruction, circulatory disorders.

Special Alterations

➡ **Intermittent pulse :-**

Occasionally missing beats.

➡ **Paradoxical pulse :-**

Pulse weaker during inspiration,

stronger during expiration
(seen in pericardial effusion,
asthma).

Water-hammer (Collapsing)

pulse :-

Sudden strong upstroke and
collapse (seen in aortic
regurgitation).

Nursing

Responsibility



Assess pulse regularly.



Note any abnormalities
(rate, rhythm, volume).



Report abnormal findings
to the physician.



Correlate with patient's
condition and other vital signs.