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 → 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 (arrh--ythmia).

(3). Volume (Amplitude/ Strength)

- Force of blood flow in the artery.
- Described as :-

Bounding (strong)

Normal

Weak/Thready

(4). Tension

- Resistance felt when compre--ssing 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
- Femoral
- Popliteal
- Posterior tibial
- Dorsalis pedis

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.