

## Principles & Procedures of NURSING FOUNDATIONS (Covers Theory part as per the Revised INC Syllabus)

#### Sushma Pandey • Avani Oke • Neena Nair

## 2nd Edition

Written by senior most faculties from the field of Nursing

#### Special Features

- Reviewed by 50+ most senior nursing faculties PAN India
- A thoroughly updated and revised edition
- 300+ Photographs, Illustrations, Instruments and Tables covered
- Text enriched with Nursing Interventions, Skills & Alerts
- A perfect amalgamation of theoretical and clinical aspects



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## Principles & Procedures of NURSING FOUNDATIONS (Covers Theory part as per the Revised INC Syllabus)



#### - Second Edition

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This book, "Principles and Procedures of Nursing Foundations (Volume I)", is a comprehensive nursing theory book built upon the premise that nursing is both a caring and a knowledge-based profession. It has been designed to provide today's students with solid foundations of nursing principles to prepare them to meet the challenges of tomorrow. This cutting-edge text illustrates how to attain and integrate knowledge from theory and practice.

This book is based on revised INC syllabus and covers all the concepts of professional nursing. The key concept of this book is that all the Units are well organized and enriched with the needed information and latest nursing evidences. This book has special features like Key Terms and relevant questions at the end of each unit for better understanding of the concepts.

We express our deep gratitude toward all those who have contributed in the successful completion and publication of this book.

We are pretty sure that this book will not only be useful for nursing students and nurses but also will prove quite handy for nurse educators in their teaching-learning process.



Sushma Pandey Avani Oke Neena Nair

## **Special Features of the Book**

#### Learning Objectives

#### After completing this unit, you will be able to:

- Define health and its changing concepts
- Describe the health-illness continuum
- Enumerate the various factors influencing health

#### Important Learning Objectives of every unit are highlighted in the beginning to help readers understand the purpose of the unit.

**Unit outline** is given in the beginning of every unit to provide the reader a glimpse of entire unit.

#### Unit Outline

- Definition of Health
- Concept of Health
- Wellness and Well-being
- Health-illness Continuum
- Dimensions of Health

#### Key Terms

- Agent: The agent is the microorganism that actually causes the disease.
- Child mortality rate: It is the number of deaths from 1 to 4 years of age during a given year per 1000 mid-year population of that age group. It excludes infant mortality rate.
- **Crude death rate:** It is the number of deaths per 1000 population in a year in a given area.
- **Disability rate:** It is the percentage of population unable to perform the routine activities due to injury or illness.

Important **Key Terms** used in the unit are presented to familiarize the readers with the important terminologies.

Numerous **Tables** are used to clarify the concepts and make the reading enjoyable and informative.

- Table 2: Showing serum electrolyte components and their normal values					
	Component	Normal values			
	Sodium	135–145 mEq/L			
	Potassium	3.5–5.3 mEq/L			
	Chloride	95–105 mEq/L			
	Calcium total	4.5–5.5 mEq/L or 8.5–10.5 mEq/L			
	Magnesium	1.5–2.5 mEq/L			
	Phosphate	1.8–2.6 mEq/L			



**Nursing Intervention** boxes are wrapped in between text highlighting the important nursing task need to be taken care during clinical practices.

#### NURSING INTERVENTION

- Monitor vital signs
- Remove any wet clothes
- Provide warm blankets to the client
- Monitor saturation level of client
- Administer humidified oxygen as per doctor's order
- Administer warm intravenous fluids to the client
- Administer medication as per doctor's order
- Closely monitor the patient for complications

At the end of every unit, Assess Yourself section covering Short Answer Qs, Long Answer Qs and Multiple Choice Qs have been added for self-evaluation.

#### **ASSESS YOURSELF** (UNIVERSITY PATTERN QUESTIONS)

#### **SHORT ANSWER QUESTIONS**

- 1. Which is the concept of health: health-illness continuum?
- 2. Mention the factors influencing health.

#### LONG ANSWER QUESTIONS

- 1. Explain the dimensions of health with example.
- 2. Discuss the factors affecting health and the role of nurses in promoting health.

#### **MULTIPLE CHOICE QUESTIONS**

- 1. Which of the following is a hereditary disease?
- a. Rabies b. Color blindness c. Polio
  - d. Small pox
- 2. In the epidemiological triad, is known to cause a disease. a. Agent b. Host
- c. Environment d. None of these

#### **ANSWERS TO MCQS**

1. b 2. a

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# UNIT 6A

## Vital Signs

#### Learning Objectives

#### After completing this unit, you will be able to:

- Describe factors that affect the vital signs and their accurate measurement
- Identify the variations in normal body temperature, pulse, respiration and blood pressure that occur from infancy to old age
- Compare methods of measurement of body temperature
- Identify factors affecting pulse
- Identify nine sites used to assess the pulse and state the reasons for their use
- Explain how to measure apical and radial pulse

- List the characteristics of pulse
- Describe the mechanism of breathing and the mechanism that controls respiration
- Describe the factors that increase or decrease the respiratory rate
- Identify the components of respiratory assessment
- Explain the determinants and factors affecting blood
  pressure
- Describe the methods used to measure blood pressure
- Describe five phases of Korotkoff sounds

#### Initiative by CBS Nursing Divis

#### Unit Outline

- Vital Signs
- Body Temperature
- Types of Body Temperature
- Fever or Pyrexia

#### Key Terms

- **Blood pressure:** Blood pressure is the force exerted by the blood on the wall of arteries.
- **Body temperature:** Body temperature is the heat of the body measured in degrees. It indicates the difference between production of heat and loss of heat.
- Fever: Fever is an increase in body temperature above normal (37°C) in response to trauma or illness.
- **Pulse:** Pulse is an alternate expansion and recoil of an artery as the wave of blood is forced through it during the contraction of the left ventricle.
- Respiration: Respiration is the process by which oxygen is taken in and carbon dioxide is given out.
- Vital signs: Vital signs comprise a person's temperature, pulse, respiration and blood pressure. (abbreviated as TPR and BP).

- Pulse
- Respiration
- Blood Pressure

#### **VITAL SIGNS**

Vital signs comprise a person's temperature, pulse, respiration and blood pressure (abbreviated as TPR and BP). They are also called cardinal signs. Vital signs are the basic component for assessing physiological and psychological health of an individual.

Vital signs or cardinal signs are named so because of the following reasons:

- Vital signs are indicators of the health status of an individual.
- These signs are governed by vital organs and often reveal the slightest deviation from the normal body functions.
- These signs help in the diagnosis of diseases and evaluate the effect of treatment, medications and nursing care.
- Significant variation in vital signs may indicate inadequate oxygen consumption, electrolyte imbalance, infections and other problems.
- Client's psychological state may also cause a variation in vital signs.

#### **BODY TEMPERATURE**

Body temperature is the heat of the body measured in degrees. It indicates the difference between production of heat and loss of heat.

#### Normal Body Temperature

In a healthy individual, the body temperature may vary between 97° and 99°F (36.1–37.2°C).

Axillary temperature is 0.3–0.6°C (0.5–1°F) lower than the oral temperature.

Rectal temperature is 0.3-0.6 °C (0.5-1°F) higher than oral temperature.

Average normal temperature for healthy adults at various sites is given below.

Oral	Axillary	Rectal	Tympanic
37°C	36.5°C	37.5°C	37.5°C
98.6°F	97.6°F	99.5°F	99.5°F

#### **TYPES OF BODY TEMPERATURE**

- **Core temperature:** It is the average temperature of structures present in the deeper tissues of the body such as the liver. It is higher than surface body temperature. Core temperature is measured at tympanic or rectal region.
- **Surface temperature:** It is the temperature of the skin, subcutaneous tissue and fat. Surface body temperature is measured at oral and axillary sites. It rises and falls in response to the environment.

#### Physiology and Regulation of Body Temperature (Fig. 1)

The body temperature is regulated by hypothalamus. Hypothalamus has two centers that regulate the body temperature:

- Heat loss center
- Heat gain center



#### Heat Loss Center

Heat loss center is situated in preoptic nucleus of anterior hypothalamus. Neurons in preoptic nucleus are heat sensitive nerve cells. Stimulation of preoptic nucleus results in cutaneous vasodilatation and sweating, which leads to loss of heat.

#### Heat Gain Center

It is situated in posterior hypothalamic nucleus. Stimulation of posterior hypothalamic nucleus causes shivering, which leads to the production of heat.

Body temperature is regulated by two mechanisms: Nursing Division

- Thermogenesis: A chemical regulation by production of heat
- Thermolysis: A physical regulation by loss of heat

#### **Heat Production**

Various mechanisms involved in the production of heat in the body are:

#### **Metabolic Activities**

The primary source of heat produced in the body is metabolism of food. During metabolism of protein, carbohydrate and fat, heat is produced as a by-product.

#### MUST KNOW

- 9 calories of heat are produced during metabolism of 1 gram of fat.
- 4.7 calories of heat are produced during metabolism of carbohydrates.
- 4.5 calories of heat are produced during metabolism of proteins.

#### **Muscular Activities**

Heat is produced in muscles both at rest and during activities. During exercise, heat is produced faster through muscle movements.

- Role of hormones: Thyroid hormone increases metabolism and heat production.
- Heat from the environment: A greater temperature in the environment also results in heat gain.
- Shivering: It increases the production of heat in the body. It is initiated by the hypothalamus.

#### Heat Loss from the Body

The primary site of heat loss is skin. Heat loss also occurs through evaporation of sweat and through elimination of urine and feces.

#### Skin

- The skin is the primary site of heat loss. The circulating blood brings heat to the skin surface where small connections between the arterioles and venules lie directly below the surface. These connections may remain open to allow heat loss through the skin or they may close and retain heat in the body. The sympathetic nervous system controls the opening and closing of the connections in response to changes in core body temperature and environmental temperature.
- Heat is transferred to the external environment through the physical process of conduction, convection, radiation and evaporation.
  - **Conduction:** It is the transfer of heat directly through a substance from hot area to cold area. For example, the body transfers heat to an ice pack causing the melting of ice.
  - **Convection:** It is the method of transfer of heat by circulating air. For example, a fan blows cool air across the surface of a warm body.
  - **Radiation:** It is the transfer of heat from the surface of one object to another that is not in contact. For example, the body gives off waves of heat from uncovered surfaces.
  - **Evaporation:** It is the process by which a substance in liquid state is converted into vapor. For example, body fluid in the form of perspiration is vaporized from the skin.

#### **Respiratory System**

The atmospheric air temperature is lower than the body temperature. So, the air that is inhaled gets warmed and it is then expelled through exhalation.

#### **Kidneys**

Urine formed in the kidneys is warmed by the heat of the body. When urine is excreted, heat is lost from the body.

#### Gastrointestinal Tract

When a person expels waste from the body, some amount of heat also gets lost from the body.

#### Factors Affecting Body Temperature

A variety of factors affect body temperature.

#### **Physiological Factors**

- Age: In infants, the body temperature varies according to the environmental temperature for first few days after birth as the temperature regulating system is not well developed during infancy. In children, the temperature is slightly (0.5°C) more than that of adults because of more physical activities. In old age, the body temperature decreases slightly as the heat production is less.
- **Gender:** Women tend to have more fluctuations in body temperature than men due to changes in hormones. The increase in progesterone secretion at ovulation increases body temperature as much as 0.5°-1°C. It decreases (0.5°C) during menstrual phase.
- **Circadian rhythm:** Many environmental and physiologic processes occur in repeated cycles of time. Some events in human recur at 24 hours intervals, referred to as circadian rhythm. In early morning, the temperature is 1°C less than that in the late afternoon and early evening. The peak elevation of a person's temperature occurs in late afternoon between 4 and 7 pm.
- Environmental temperature variations: Infants and older adults are more likely to be affected by environmental temperatures because their temperature regulating mechanisms are inefficient. Hot and cold environmental temperature can influence our body temperature.
- After meals: The body temperature rises slightly (0.5°C) after meals.
- Exercise: During exercise, the temperature rises due to the production of heat in muscles.
- Sleep: During sleep, the body temperature decreases by 0.5°C.
- Emotion: During emotional conditions, the body temperature increases through hormonal and neural stimulation.

Sites	Advantages	Disadvantages	Contraindications
Mouth/oral	<ul> <li>Correct body temperature can be recorded as there is good blood supply under the tongue.</li> <li>No privacy is needed.</li> <li>Most available site.</li> </ul>	<ul> <li>There is possibility of recording false temperature due to incorrect placement of thermometer.</li> <li>There are chances of cross infection if thermometer is not disinfected properly.</li> <li>Bad taste in mouth due to disinfectant.</li> <li>There is a chance of breaking the thermometer, if bitten.</li> <li>Inaccurate, if the client has eaten hot or cold food or drinks.</li> </ul>	<ul> <li>Children under 6 years of age.</li> <li>Cannot be used for unconscious, confused client who cannot follow instructions.</li> <li>Clients having history of convulsions.</li> <li>Clients who have injuries, inflammation or surgery of mouth.</li> <li>Mouth breathers</li> <li>Client with frequent attack of cough.</li> </ul>
Axilla	<ul> <li>Safest method.</li> <li>Less discomfort for client.</li> <li>No bad taste of disinfectant.</li> <li>No fear of biting the thermometer.</li> <li>The nurse can keep the thermometer in proper position without difficulty.</li> </ul>	<ul> <li>Less accurate.</li> <li>May give false reading, if the bulb of thermometer remains in the air or encounter the clothing.</li> <li>Need more time for recording.</li> <li>If axilla not wiped properly, it may give false reading due to the moisture from perspiration.</li> </ul>	Cannot be used in patients who have surgery done in the axillary region.

#### Sites for Taking Temperature

Sites	Advantages	Disadvantages	Contraindications
Rectal	Most reliable as rectum contains a large amount of blood supply and reading is not influenced by external air.	<ul> <li>Need privacy.</li> <li>Need lubrication of bulb.</li> <li>May get false reading if rectum is loaded with fecal matter.</li> <li>In newborns and infants, insertion may result in ulceration.</li> </ul>	<ul> <li>Clients who had rectal surgery or inflammation of the rectum.</li> <li>Clients with diarrhea.</li> <li>Clients with treatments. For example, bowel wash, enema, etc.</li> </ul>
Tympanic membrane	<ul> <li>Easy access.</li> <li>Reflects core temperature.</li> <li>Gives rapid temperature readings in very young, confused or unconscious clients.</li> </ul>	<ul> <li>Tympanic membrane thermometer is costly.</li> <li>Risk for injury to tympanic membrane, if not placed properly.</li> </ul>	In case of ear infection, injury or ear surgery.

#### **Different Types of Thermometer**

Body temperature can be measured with a variety of thermometers.

#### Glass Thermometer or Clinical Thermometer (Fig. 2)

A glass thermometer with mercury bulb is used to measure body temperature. It is available in both Fahrenheit and Celsius scales.

A thermometer has two parts:

- 1. A bulb containing mercury: The bulbs have different sizes and shapes. The oral thermometers have long and slender bulbs' while the rectal thermometers have short and round-shaped bulbs. There is a constriction above the bulb that prevents the mercury from falling into the bulb on cooling.
- 2. A stem in which the mercury can rise: The stem is a graduated scale representing the degree of temperature. The lowest reading is 35°C or 95°F and highest is 43.3°C or 110°F as the body temperature above or below these points are rare. The long lines along the stem represent the degrees and short lines represent tenths of degrees. Mercury is a liquid metal, with silvery appearance used in the thermometers as it is very sensitive to small changes in temperature. The expansion of mercury is uniform, and it is easily visible.

The following points are to be kept in mind to prevent the thermometer from breaking:

- Never hold the thermometer by the bulb. Always grasp the thermometer securely by the upper end of stem. To bring the mercury down, grasp the thermometer securely and shake it down by the quick movement of wrist.
- Do not fall or strike the thermometer against anything



Fig. 2: Clinical thermometer

- The thermometers are never washed with hot water because the heat expands the mercury beyond the capacity of the stem and the thermometer can break.
- Never store them in disinfectant solutions. After use, disinfect and put them in containers with the bulb resting on a smooth surface.
- If the thermometer is broken, then wear the rubber gloves and wipe mercury beads off clothing, skin or other disposable items with a paper towel and place it immediately into a plastic bag and then discard it.

```
Conversion of Temperature Reading

To convert Fahrenheit to Celsius, subtract 32 from the Fahrenheit reading and multiply the result by 5/9

C = (F - 32) \times 5/9

Example: To convert 102°F to Celsius

C = (102 - 32) \times 5/9

70 \times 5 / 9 = 38.8°C

To convert Celsius to Fahrenheit, multiply the centigrade reading by 9/5 and add 32 to the product

F = (C \times 9/5) + 32

Example: To convert 37°C to Fahrenheit

F = (37 \times 9/5) + 32

= 66.6 + 32 = 98.6°F
```

#### Electronic Thermometer

Electronic and digital thermometers consist of a rechargeable battery powered display unit and a temperature sensitive probe covered by a disposable plastic sheath. This thermometer provides readings in less than a minute. An electronic thermometer can be used for oral, axillary or rectal temperature measurements. They provide a safe, accurate and fast method for measuring temperature. These thermometers have separate unbreakable probes for oral and rectal use. Sound signals when the peak temperature readings have been measured. The only disadvantage of electronic thermometers is their high cost and need for regular maintenance.

#### Tympanic Membrane Thermometer

It is a portable and handheld device. It is an otoscope-like speculum with an infrared sensor tip, which detects heat radiated from the tympanic membrane. The probe is inserted into the ear canal tightly enough to seal the opening; the reading appears in the display unit within 2–5 seconds of placement of thermometer in auditory canal. Tympanic membrane temperature is commonly taken in children, especially children younger than 6 years of age. It should not be used in clients having ear drainage, scarred tympanic membrane, any surgery of the ear, etc.

#### **Disposable Thermometers**

Single-use disposable thermometers are the strips of plastic with a temperature sensor at one end. They are useful while caring for patients on protective isolation. Chemical dots on the thermometer change color to reflect the temperature readings. The thermometer is removed after 60 seconds and read after 10 seconds to ensure the stability of temperature reading.

#### **FEVER OR PYREXIA**

Fever is an increase in body temperature above normal (37°C) in response to trauma or illness. A person with fever is said to be febrile and the one who has not is afebrile.

#### **Causes of Fever**

- **Infections:** Fever results from a response to bacterial or viral infections. Certain pyrogens released from bacteria, viruses or parasites affect the heat regulating system in hypothalamus resulting in the production of excess heat and fever.
- **Disease conditions:** Brain lesions, certain malignant neoplasm, blood diseases like leukemia, embolism and thrombosis, skin abnormalities interfere with heat loss.
- Exposure to hot environment
- Allergic reactions
- Surgical trauma and crush injuries

#### **Types of Fever**

- **Constant fever:** The body temperature remains consistently elevated and fluctuates less than 2°C.
- **Remittent fever:** The body temperature fluctuates more than 2°C above normal but does not reach normal between fluctuations.
- **Intermittent fever:** The body temperature alternates regularly between a period of fever and a period of normal temperature.
- **Inverse fever:** In this type, the highest temperature is recorded in the morning hours and lowest temperature in the evening, which is contrary to the normal course of fever.
- **Relapsing fever:** The body temperature returns to normal for at least a day, but then again, the fever recurs.

#### **Stages of Fever**

- **Onset or invasion:** Onset or invasion is the stage in which there is a sudden or gradual rise in temperature.
- Fastigium or stadium: Fastigium or stadium of fever is a stage when the body temperature has reached its maximum and remains constant at a high level.
- **Defervescence or decline:** Decline of fever is a stage when the elevated temperature is returning to normal. Fever may decline suddenly or gradually.
- **Crisis:** Crisis is a sudden return to normal temperature.
- Lysis: Lysis is the gradual return to normal temperature.

#### Signs and Symptoms of Fever

Headache, joint pain, muscle pain, loss of appetite, general weakness, dehydration, coated tongue, shallow and rapid breathing, increased pulse rate, sweating, shivering

#### **Management of Fever**

#### Assessment of Patient

- Constantly assess a client with fever.
- Monitor vital signs frequently to check the progress of the client condition
- Assess skin for color and for any signs of dehydration
- Monitor the intake and output of client
- Monitor the laboratory records of client
- Note and report any worsening of the client's condition immediately

#### Regulation of Body Temperature

- Make the room well-ventilated
- Switch on the fan
- Remove the blankets and excess clothing but protect the client from getting draughts. Remove excess blankets when the client feels warm
- Keep the client hydrated by providing fluids
- Provide tepid sponge to bring the temperature to normal.
- Provide cold compress, if needed.
- Prevent shivering as it increases metabolic activities, produces heat, and increases oxygen requirement and it takes longer time to reduce temperature in a client with shivering
- Administer antipyretics like paracetamol as per doctor's order

#### Meeting the Nutritional Needs

- Provide the client a high calorie diet as cellular metabolism increases during fever. The oxygen consumption in the body tissues also increases. Approximately 13% oxygen consumption occurs for each centigrade degree of rise in temperature.
- Provide small and frequent meal to the client. The diet should be easily digestible and palatable. It should be soft and should contain plenty of fluids as it will help empty the bowel regularly.
- Provide adequate fluids (2500–3000 mL/day) to prevent dehydration as the clients with fever lose large amount of fluid through sweating.
- Administer intravenous fluids if nausea, vomiting, or diarrhea is present.
- An intake output chart should be maintained in all clients with fever.

#### **Rest and Sleep**

Calm and quiet environment should be provided to the client. Client should be asked to take adequate rest. The client should be rest in a comfortable position.

Nursing Knowledge Tree

#### Maintain Personal Hygiene

- Provide oral care to the client.
- Apply emollient to the dry lips to prevent cracking.
- Sponge bath should be given daily to maintain hygiene.
- If profuse sweating is present, frequent sponging is essential.
- Provide client with cotton garments as they absorb the sweat.

#### Follow Safety Measures

- Never leave the client with high fever alone. Rigors and convulsions may occur at any time.
- Raise the side rails to prevent fall.
- When the temperature is brought down to the normal level, the client should be protected with warm blankets to prevent hypothermia.

#### **Temperature Alterations**

#### Hyperthermia

Hyperthermia is a condition in which the body temperature is raised above 37.5°–38.3°C (99.5°–100.9°F). The difference between fever and hyperthermia is the mechanism.

#### Causes

- Excessive metabolic production of heat
- Excessive environmental heat
- Impaired heat loss
- Damage to the central nervous system from brain injury or hemorrhage and any type of injury to hypothalamus
- Certain medications (anticholinergics can cause mild hyperthermic episodes)

#### Signs and Symptoms

- Increased temperature
- Rapid breathing
- Fast and weak pulse
- Hot, dry skin
- Headache
- Nausea, vomiting
- Low blood pressure
- Fainting
- Hyperthermia from neurological disease may cause little or no sweating.

#### **Nursing Intervention**

- Monitor vital signs
- Monitor blood reports of client
- Remove extra blankets when the patient feels warm, or provide extra warmth when the patient feels cold
- Provide adequate fluids. If client vomits, administer intravenous fluids.
- Monitor intake and output of client
- Provide small and frequent diet to the client
- Maintain oral hygiene of the client
- Give the patient tepid sponge bath
- Administer antipyretics as per doctor's order.

#### **Heat Stroke**

Heat stroke is a condition in which the body temperature is raised above 40°C (104°F).

Prolonged exposure to the sun or high environmental temperature causes heat stroke. It is more common in young children who are unable to remain in hot environment and who suffer from chronic medical conditions that impair thermoregulation.

#### Signs and Symptoms

- Tachycardia
- Tachypnea
- Hot and dry skin
- Nausea
- Excess thirst
- Giddiness
- Delirium
- Confusion
- Seizures (common in children)

#### Nursing Intervention

- Monitor vital signs
- Monitor intake and output, assess skin color
- Give intravenous fluids
- Apply hypothermia blankets
- Give adequate fluids
- Perform cold sponging

#### Hypothermia

Hypothermia is a condition in which the body temperature falls below 35°C or 95°F.

#### Classification of Hypothermia

- Mild hypothermia (32°–35°C)
- Moderate hypothermia (28°–32°C)
- Severe hypothermia (20°–28°C)

#### Causes

- Exposure to low temperatures
- Conditions that impair thermoregulation, increase heat loss, decrease heat production

#### **Risk Factors**

- Substance use disorders
- Extremes of age
- Sepsis
- Hypothyroidism
- Major trauma

#### Iursing Knowledge Tree

- Signs and Symptoms
- Mild hypothermia: Fast heart rate and respiratory rate, high blood pressure, shivering, mental confusion.
- Moderate hypothermia: Confusion, slurred speech, amnesia, decreased reflexes.
- Severe hypothermia: Heart rate and respiratory rate decrease, blood pressure decrease, cold, inflamed skin, hallucinations, lack of reflexes, dilated pupils, pulmonary edema.

#### Nursing Intervention

- Monitor vital signs
- Remove any wet clothes
- Provide warm blankets to the client
- Monitor saturation level of client
- Administer humidified oxygen as per doctor's order
- Administer warm intravenous fluids to the client
- Administer medication as per doctor's order
- Closely monitor the patient for complications

#### Rigor

Rigor is a sudden severe attack of shivering characterized by a rise in temperature.

#### Stages of Rigor

- **First stage:** It is also called cold stage. Temperature rises rapidly to 103°F. Patient shivers uncontrollably. Skin is cold to touch. Face looks pale and pinched; pulse is feeble and rapid.
- Second stage: It is also called hot stage. Shivering stops, skin is hot and dry. Patient will complain of headache and excessive thirst.
- Third stage: It is also called sweating stage. Patient sweats profusely. Temperature and pulse rate decreases. Patient may go into a state of shock and collapse, if not cared properly.

#### Management of Patient with Rigor

- First stage: Patient should be kept warm by putting on extra blankets. Provide warm drinks to the patient. Keep the patient warm.
- Second stage: Temperature should be recorded every 10–15 minutes. Patient should be given cool drinks; cold compress should be applied on head to relieve headache. Remove extra blankets and hot appliances. Give tepid sponge. Carefully monitor the patient.
- Third stage: Monitor vital signs make patient comfortable. Frequent sponging should be done as patient sweats profusely. Advise the client to wear comfortable cotton clothes. Sweet drinks should be given to the client. When temperature comes down, but the pulse does not improve, it is considered false crisis.

#### PULSE

Pulse is an alternate expansion and recoil of an artery as the wave of blood is forced through it during the contraction of the left ventricle. Peripheral pulse is the pulse located at the periphery of the body. Apical pulse or central pulse is located at the apex of the heart.

#### Physiology and Regulation

Pulse is regulated by the autonomic nervous system through the sinoatrial node (SA node). Sympathetic stimulation of SA node increases the heart rate and force of contraction; and parasympathetic stimulation of SA node decreases the heart rate. Pulsation is felt as the wave of blood is pumped into the arterial circulation by the contraction of the left ventricle.

#### **Characteristics of Pulse**

- **Pulse rate:** It is the number of pulse beats in a minute. The normal pulse rate for adults ranges between 60-100 beats per minute. The pulse rate may fluctuate in response to activity, medications, pain, emotions, heat and cold and any disease.
- Tachycardia: Tachycardia is an increase in the heart rate above 100 beats per minute.
- Bradycardia: Bradycardia is a decrease in the heart rate below 60 beats per minute.
- **Rhythm:** The pulse rhythm is the pattern of the pulsations and the pauses between them. Under normal conditions, pulse appears at regular intervals. An irregular pattern of heartbeats is called dysrhythmia.
- **Volume/strength:** It refers to the fullness of artery. It is the force of the blood felt at each beat. Volume depends upon the amount of blood in the arteries. Pulsation is easily felt with light pressure. Pulse can range from absent to bounding (or full).
- **Tension:** Tension is the degree of compressibility. It is said to be high when the artery is difficult to compress and low when it is easy to compress.
- Equality: Pulse on both sides of peripheral systems should be assessed. A nurse assesses both radial pulses to compare the characteristics of each. An unequal pulse between left and right radial arteries is observed in peripheral embolism, aortitis, aneurysm, etc.

#### Factors Affecting Pulse

• Age: As age increases, the pulse rate decreases. In an adult, the normal resting heart rate ranges from 60 beats/min to 100 beats/min.

Age	Approximate range (beats/min)
Newborn	120–160
1–12 months	80–140
12 months–2 years	80–130
2–6 years	75–120
6–12 years	75–110
Adolescent to adult	60-100

- **Gender:** After puberty, the average pulse rate of a male is slightly lower than that of a female.
- **Exercise:** Normally, the pulse rate increases after exercise. The greater the intensity of the exercise, the more your heart rate will increase. Heart rate does not immediately return to normal after stopping exercise. It will take some time. The more fit you are, the sooner your heart rate will return to normal.
- Fever: During the febrile period, the pulse rate increases when the temperature rises by 1°C. The pulse rate increases, on an average, by 8.5 beats/min.
- **Medications:** Some medications decrease the pulse rate and others increase it. For example, digitalis decreases heart rate and epinephrine increases heart rate.
- Hemorrhage: Generally, blood loss leads to an increase in heart rate. The rate will depend on the amount of blood loss.
- Stress: Stress stimulates the sympathetic nervous system and increases the overall activity of the heart. Stress increases the rate as well as the force of heartbeat. Anxiety, fear and pain stimulate the sympathetic nervous system and increase the pulse rate.
- **Position changes:** When a person is sitting or standing, blood usually pools in dependent vessels of the venous system. Pooling results in a transient decrease in the venous blood returning to the heart and this leads to a subsequent reduction in blood pressure and increase in heart rate.
- **Disease conditions:** Certain diseases such as some heart conditions or those that impair oxygenation can alter the resting pulse rate.

#### Assessment of Pulse

The pulse can be assessed by two methods. These are:

#### Palpation

A pulse is normally palpated by applying light pressure with the three middle fingers of the hand except the apex of the heart. If the pulse is regular, count for 30 seconds and multiply by 2. If it is irregular, count for a minute. The pads on the most distal aspects of the fingers are the most sensitive areas for detecting pulse. Thumb should not be used to palpate pulse as thumb has a pulse that may be mistaken with the client's pulse. Assess the pulse rhythm by noting the pattern of intervals between the beats. A normal pulse has equal time between beats. Assess the pulse volume. A normal pulse can be felt with a moderate pressure and the pressure is equal with each beat.



#### Auscultation (Fig. 4)

- Stethoscope is used for assessing apical pulse, which is the most accurate assessment of pulse rate. A Doppler ultrasound is used to assess the difficult pulses.
- The apical pulse is a point of maximum impulse and is located at the apex of heart. First, we need to locate the apical pulse.
- Locate the sternal notch. It is located in between the clavicles and it is the notched-out area above the sternum.
- Go down slightly and feel for a hump. This is known as the angle of Louis.
- Then slide your fingers to the left midclavicular line. Now, fingers will be at 2nd intercostal space.
- Proceed downward and reach till 5th intercostal space. This is the location of the apical pulse.
- Listen to the apical pulse using stethoscope for 1 minute.



Fig. 4: Location of apical pulse



#### Parts of Stethoscope

Parts of Stethoscope are shown in Figure 5.

- **Earpieces:** Earpieces should fit properly into the ear.
- **Binaurals:** They should be positioned at correct angles to properly fit into ear canals.
- **Tubing:** The tubing is responsible for transferring sounds picked up by the chestpiece.
- Stem: The stem connects the stethoscope tubing to the chestpiece.
- **Chestpiece:** Chestpiece consists of bell and diaphragm. The diaphragm is the circular end of the chestpiece and it is larger than bell. It transmits high-pitched sounds. Bowel, lung and heart sounds are auscultated using diaphragm. Diaphragm side is normally used for adult patients. The bell of the chestpiece transmits low-pitched sounds created by low velocity movement of blood. Bell side is best for pediatric or thin patients.

#### **Alterations in Pulse**

- Tachycardia: Tachycardia is the heart rate above 100 beats/min.
- Bradycardia: Bradycardia is the resting heart rate below 60 beats/min in an adult.
- **Dysrhythmia:** It is the abnormal rhythm of heartbeat.
- Absent pulse: No pulsation is felt despite extreme pressure.
- **Intermittent pulse:** It is the pulse in which there is occasionally missed beat due to premature atrial or ventricular contraction.
- **Sinus arrhythmia:** It is a condition in which the pulse rate is rapid during inspiration and slow during expiration.
- Thready pulse: Pulsation is not easily felt, and slight pressure causes it to disappear.
- Weak pulse: It is stronger than thready pulse and light pressure causes it to disappear.
- **Bounding pulse:** It is a strong pulse that does not disappear with moderate pressure. It is due to forceful heartbeat.
- Pulsus alternans: It is an arterial pulse with alternate strong and weak beats.
- **Bigeminal pulse:** It is a type of pulse in which every other beat comes early. The second beat feels weak due to inadequate filling of ventricles between the two beats. It may be so weak that it fails to produce a palpable peripheral pulse.
- Paradoxical pulse: The strength of pulse wave varies feeling weaker during inspiration.

#### RESPIRATION

Respiration is a process by which oxygen is taken in and carbon dioxide is given out.

#### **Types of Respiration**

Respiration is often classified into two types:

- 1. External respiration: It involves exchange of oxygen and carbon dioxide between lungs and blood.
- 2. Internal respiration: It involves exchange of oxygen and carbon dioxide between blood and tissues.

Respiration involves two processes:

- 1. Inspiration: It is the process sin which the air enters the lungs from atmosphere.
- 2. Expiration: It is the process in which the air leaves the lungs.

#### Physiology and Regulation of Respiration (Fig. 6)

The rate of breathing can change in response to body demands. These changes are brought about by the inhibition or stimulation of the respiratory muscles by respiratory centers in the medulla and pons. The respiratory centers are activated by impulses from chemoreceptors located in the aortic arch and carotid arteries, and from irritant receptors in the lungs and from receptors in muscles and joints. An increase in the amount of carbon dioxide is the most powerful respiratory stimulant causing an increase in respiratory rate and depth.



Fig. 6: Regulation of breathing



Fig. 7: Mechanism of breathing

#### Mechanism of Breathing (Fig. 7)

Inspiration is an active process involving the contraction of diaphragm and external intercostal muscles. Expiration is a passive process involving elastic recoiling of lungs and thoracic cage. During inspiration, thoracic cage enlarges, and lungs expand, so that air enters the lungs easily. During expiration, the thoracic cage and lungs decrease in size and attain the preinspiratory position so that air leaves the lungs easily.

Respiration is a reflex process. Respiratory centers are in the medulla oblongata and pons of the brain. Chemoreceptors are located centrally in the medulla and peripherally in the carotid and aortic bodies. These receptors respond to changes in the concentration of oxygen and carbon dioxide in arterial blood.

#### **Characteristics of Respiration**

Normal breathing is regular, effortless, even and produces no noise. Characteristics of respiration are as follows:

- **Rate:** Rate is the number of full respirations in a minute. Normal respiratory rate in an adult is 12–20 breaths/min. As the age increases, the respiratory rate decreases.
- **Depth:** It can be described as normal, deep or shallow. Deep inspirations are those in which large volume of air is inhaled and exhaled, inflating a major part of the lungs. Shallow respiration involves the exchange of small volume of air and often the minimal use of lung tissue. In normal respiration, an adult inhales about 500 mL of air.
- **Rhythm:** It is the regularity of expiration and inspiration. In normal respiration, the rhythm is regular.

#### **Factors Affecting Respiration**

- Age: As the age increases, the respiratory rate decreases. The normal respiratory rate in an adult ranges between 12 and 20 breaths/min. In infants, the respiratory rate is faster.
- **Gender:** Females shave more rapid respiration than males. In males, respiratory movements are primarily diaphragmatic, whereas in women there is greater use of intercostal muscles.

- **Exercise:** Exercise increases the rate and depth of respiration to meet the body's need of additional oxygen and to expel carbon dioxide.
- Emotions: Fear, anxiety and other related emotions increase the respiration rate and depth.
- Change in atmospheric pressure: At high altitudes, there is insufficient oxygen. Therefore, respiration increases to improve oxygen supply to the tissues.
- **Medications:** Medications may increase or decrease respiration depending upon the action of drug. For example, respiratory depressants such as morphine decreases respiration, whereas amphetamine and cocaine are respiratory stimulants that increase respiration.
- **Disease conditions:** The respiratory rate and depth may increase or decrease depending upon the type of disease condition. For example, anemia may result in an increased rate of respiration, whereas paralysis of respiratory muscles decreases respiration.
- Pain: Pain alters rate and rhythm of respiration. Severe pain increases respiratory rate.
- **Smoking:** Chronic smoking causes changes in the lungs resulting in an increased rate of respiration even at rest.
- Fever: Fever increases respiratory rate.
- Hemorrhage: Blood loss will cause an increase in respiratory rate to allow supply of oxygen to the damaged tissues.
- Dehydration: Dehydration affects the exchange of vital gases in the lungs causing an increase in respiration.

#### Assessment of Respiration

Respiratory assessment is done by placing a hand against the patients' chest to feel the chest movements or by placing the patients' arm across the chest and observe the chest movements, while taking the radial pulse. Because young children are diaphragmatic breathers, observe the rise and fall of the abdomen. Awareness of respiratory assessment could cause the client to voluntarily alter the respiratory pattern. Count the respiratory rate for 30 seconds, if the respirations are regular. Count for 1 minute, if they are irregular. An inhalation and an exhalation are counted as one respiration. Assess the respirations for depth by watching the movement of the chest. Observe the respiration for rhythm. Normally, respirations are evenly spaced. Observe the type of respirations by the sounds they produce and the efforts taken. Normally, respirations are silent and effortless.

#### **Alterations in Respiration**

- Apnea: It refers to the absence of respiration or cessation of respiration for several seconds.
- Asphyxia: It is a state of suffocation due to insufficient supply of oxygen in the body.
- **Dyspnea:** It refers to difficulty in breathing characterized by an increased effort to inhale and exhale.
- Bradypnea: It refers to decreased respiratory rate less than 10 breaths/min.
- **Tachypnea:** It refers to respiratory rate greater than normal resulting in abnormally rapid breathing (24 breaths/min).
- Wheeze: It is continuous high-pitched musical whistling sound that occurs due to the narrowing or partial obstruction of airways.
- Stridor: It is a harsh, shrill sound heard during inspiration with laryngeal obstruction.
- **Orthopnea:** In this, client can breathe only in upright position.
- **Hyperventilation:** Rate and depth of respiration increase and there is excessive intake of O<sub>2</sub> and exhalation of CO<sub>2</sub>.
- Hypoventilation: Rate and depth of respiration decrease and there is decreased intake of O<sub>2</sub> and exhalation of CO<sub>2</sub>.

- Cheyne-Stokes respiration: It is an abnormal pattern of breathing characterized by deeper and sometimes faster followed by a gradual decrease that results in a temporary stop in breathing. On an average, each cycle lasts between 30 seconds and 2 minutes.
- **Kussmaul's breathing:** It is characterized by deep and rapid breathing pattern. It is commonly caused by diabetic ketoacidosis.
- **Biot's respiration:** It is an abnormal pattern of breathing characterized by regular deep inspirations followed by regular or irregular periods of apnea.

#### **BLOOD PRESSURE**

Blood pressure is the force exerted by the blood on the wall of arteries. The pressure is exerted when the blood flows through the arteries. Blood pressure is measured in millimeters of mercury (mm Hg) and is recorded as a fraction. Arterial blood pressure is expressed in four different terms:

- **Systolic blood pressure:** It is defined as the maximum pressure exerted on the arteries during contraction of ventricles. The normal systolic pressure is 120 mm Hg. It ranges between 110 and 140 mm Hg.
- **Diastolic blood pressure:** It is the minimum pressure exerted on the arteries during relaxation. The normal diastolic pressure is 80 mm Hg. It varies between 60 and 80 mm Hg.
- **Pulse pressure:** Pulse pressure is the difference between the systolic and diastolic pressure. Normally, it is 40 mm Hg.
- Mean arterial blood pressure: It is the average pressure existing in the arteries. It is the diastolic pressure plus one third of pulse pressure. Normal mean arterial pressure is 93 mm Hg.

#### Physiology and Regulation of Blood Pressure

Blood pressure is controlled by a variety of mechanisms to maintain adequate tissue perfusion.

#### Peripheral Resistance and Compliance

Normally, arterioles are in a state of partial contraction resulting in a relatively constant level of resistance to blood flow. This is called peripheral resistance. It is one of the main factors affecting blood pressure.

Arteries have a considerable quantity of elastic tissue that allows them to stretch and distend, which is called compliance. The elasticity of the walls in addition to the resistance of the arterioles helps to maintain normal blood pressure.

#### Neural and Humoral Mechanisms

The autonomic nervous system maintains short-term regulation of blood pressure. These mechanisms include circulatory system baroreflex and chemoreceptor mediated reflexes, as well as factors outside the circulatory system, such as pain and cold, that affect blood pressure responses.

Many different hormones and humoral mechanisms also help regulate blood pressure. The renin-angiotensinaldosterone system controls vasoconstriction to increase peripheral vascular resistance and increases sodium and water retention by the kidneys to increase circulatory fluid volume thereby increasing blood pressure.

#### Cardiac Output

The quantity of blood forced out of the left ventricle with each contraction is called the stroke volume. The cardiac output is the amount of blood pumped per minute, and averages from 3.5 L/min to 8.0 L/min in a healthy adult. This volume is determined by the formula cardiac output = stroke volume × heart rate. An increased cardiac output results in an increased blood pressure. A weak cardiac pumping action results in a lower blood pressure.

#### Factors Affecting Blood Pressure

- Age: Blood pressure increases as age advances. The older adults have decreased elasticity of the arteries, which increases peripheral resistance and thus, increases blood pressure.
- **Gender:** In females, up to the period of menopause, the blood pressure is low (up to 5 mm Hg) as compared to the males of same age. After menopause, the pressure in females becomes equal to that of males of same age.
- **Diurnal variation:** In early morning, the pressure is slightly low. It gradually increases and reaches maximum at noon. It becomes low in the evening.
- Weight: Blood pressure is usually higher in obese people than that of thin people.
- After meals: The blood pressure increases for a few hours after meals due to an increase in cardiac output.
- **During sleep:** Usually, the pressure is reduced up to 15–20 mm Hg during sleep. It increases slightly during sleep associated with dreams.
- Emotional conditions: Emotions such as anger, fear, excitement and pain generally cause the blood pressure to rise, but the pressure falls to normal when the situation eases.
- After exercise: After moderate exercise, systolic pressure increases by 20–30 mm Hg. After heavy muscular exercise, the systolic pressure rises by 40–50 mm Hg and the diastolic pressure decreases.
- **Posture:** There may be some changes in blood pressure when you move from one position to other. This may be noticeable when you move from a sitting or lying down position to standing. When you stand, gravity causes blood to pool in your lower body, this causes a temporary drop in blood pressure. But when this drop in blood pressure due to a change in position (either supine to standing or sitting to standing) lasts longer than normal leading to weakness or fainting, it is called postural hypotension or orthostatic hypotension.
- **Disease conditions:** Diseases affecting the circulatory system and kidneys may increase the blood pressure. Diseases that weaken the heart may lower the blood pressure.
- **Hemorrhage:** Hemorrhage causes a low blood pressure by decreasing the volume of blood in the blood vessels.
- **Increased intracranial pressure:** Increased intracranial pressure usually produces a rise in the blood pressure. For example, head injury, brain tumors. **ursing Division**
- Medications: Oral contraceptives cause a mild increase in blood pressure in many women.

#### Assessment of Blood Pressure

#### Sites for Checking Blood Pressure

- **The upper arm:** The blood pressure is usually assessed in the client's upper arm in the brachial artery with a standard stethoscope.
- **Thigh:** When the blood pressure cannot be assessed on either arm, check the blood pressure in the thigh. To check the blood pressure, place the cuff around the bottom third of the client's thigh. The cuff's artery line is aligned with the popliteal artery to check the pressure. The blood pressure measured in the thigh is always higher than that of arm.

#### **Equipment and Techniques**

- **Direct method:** In direct method, the catheter is inserted into a brachial or femoral artery. This method gives an accurate measurement.
- Indirect method: Indirect method employs either the auscultatory or palpatory method.

- Auscultatory method: In this method, the nurse pumps the pressure to about 30 mm Hg above the point where the last sound was heard. The nurse identifies a series of sounds when assessing the blood pressure, which are called Korotkoff sounds.
  - **Phase I:** It refers to the pressure level at which the first faint, clear tapping sounds are heard. These sounds gradually become more intense. The first tapping sound heard during deflation of the cuff is the systolic blood pressure.
  - Phase II: It refers to the period during deflation when the sounds have swishing quality.
  - **Phase III:** It refers to the period during which the sounds are crisper and more intense but softer than phase I.
  - **Phase IV:** It refers to the time when the sounds become muffled and have a soft blowing quality.
  - **Phase V:** It refers to the pressure level at which the last sound is heard. This pressure is considered the diastolic pressure.
- **Palpatory method:** Palpatory method is used when Korotkoff sounds cannot be heard/when an auscultatory gap occurs especially in hypertensive patients. Empty air from the cuff and apply the cuff firmly around the patient's arm. Feel the radial pulse. Inflate the cuff until the radial pulse disappears. Inflate 30–40 mm above and release slowly until the pulse returns. This denotes systolic pressure. Diastolic blood pressure cannot be measured by this method.

#### Equipment Used for Assessing Blood Pressure

- **Sphygmomanometer and stethoscope:** There are two types of sphygmomanometers.
  - Aneroid sphygmomanometer (Fig. 8): An aneroid sphygmomanometer has a calibrated dial with a needle that points to the calibrations.
  - Mercury sphygmomanometer: It is a calibrated cylinder filled with mercury.

It consists of a cuff, tubing, manometer bulb and valve.

- **Cuff:** The cuff contains an airtight flat rubber bladder covered with cloth. Rubber bladder when filled squeezes the arms to obstruct the flow of blood through the artery.
- **Bulb:** It is a handheld air pump that is used to pump the air into the cuff.
- **Manometer:** It is a part of the sphygmomanometer that measures the blood pressure in mm Hg.
- **Valve:** Valve allows for controlled inflation and deflation of the cuff.
- **Tubing:** Two tubes are connected to the bladder within the cuff. One is connected to the manometer and the other is attached to bulb used to inflate the bladder.



Fig. 8: Aneroid sphygmomanometer

#### **Alterations in Blood Pressure**

#### **Hypertension**

Hypertension is blood pressure that is above normal for a sustained period. It is often called the silent killer. The cause of hypertension is dysfunction of the neurohormonal system. Overactivation of both angiotensin and aldosterone results in an increase in blood pressure. An elevated blood pressure of unknown cause is called primary hypertension. An elevated blood pressure of known cause is called secondary hypertension.

Category	Systolic	Diastolic
Prehypertension	120–139	8 <mark>0</mark> –89
Stage 1	140–159	9 <mark>0</mark> –99
Stage 2	More than or equal to 160	More than or equal to 100

#### **Hypotension**

Hypotension is below normal blood pressure. Hypotension might result from vasodilation of the arterioles, failure of the heart to function as an effective pump or loss of blood volume.

Category	Systolic	Diastolic
Hypotension	Less than 90 mm Hg	L <mark>e</mark> ss than 60 mm Hg

#### Postural/Orthostatic Hypotension

Postural hypotension is a low blood pressure associated with weakness or fainting when one rises to an erect position (either supine to sitting, supine to standing, or sitting to standing). Most vulnerable people for postural hypotension are older adults, patients who have been on prolonged bed rest and those who are dehydrated or have significant blood loss.

### lursing Knowledge Tree

#### ASSESS YOURSELF (University Pattern Questions)

#### **Short Answer Questions**

- 1. What do you understand by assessment of respiration?
- 2. What are the types of fever?
- 3. What are the factors affecting rate, depth and movement of respiration?
- 4. How will you provide nursing care of a patient with fever?
- 5. What are the characteristics of normal pulse?

#### **Long Answer Questions**

- 1. Define blood pressure and describe the variations in blood pressure.
- 2. List the factors causing variations in blood pressure and write the scientific principles related to blood pressure.
- 3. Define pyrexia and enumerate factors affecting body temperature.
- 4. List different types of fever and describe nursing management of patient with fever.

- 5. Write the three most common sites for measuring body temperature with advantages and disadvantages and write the nursing intervention for a client with fever.
- 6. Define hyperthermia and discuss physiology of thermoregulation.
- 7. Describe nursing care plan for a client with hyperthermia.

#### **Multiple Choice Questions**

1.	Vital signs include:		
	a. Temperature	b.	Pulse
	c. Respiration	d.	All of the <mark>s</mark> e
2.	Heat is lost by:		
	a. Conduction	b.	Convection
	c. Evaporation	d.	All of the <mark>s</mark> e
3.	Rectal temperature is approximately:		
	a. 10°F higher than oral temperature		
	b. 10°F lower than oral temperature		
	c. 20°F higher than oral temperature		
	d. None of the above		
4.	The area in the arm where the brachial artery can be palpated in	s:	
	a. Antecubital fossa		
	b. Upper shoulder region		
	c. Forearm		
_	u. Poplited lossa		
5.	A patient's temperature is 38.8°C. The Fahrenheit equivalent is:	h	100%
	a. 99.8	b. d	102.2°
6		u.	103.2
6.	The normal heart sound heard on auscultation are:	h	6162 000
	a. 5051	b. d	5152
-	An Initiative by CBS Nursing I	u.	3334
7.	The difference between apical pulse and radial pulse is termed a	as:	Asystole
	a. Puise pressure	d.	Asystole Pulse deficit
~		u.	ruise denen
8.	Blood pressure is the measurement of the:		
	b. Force of blood against an artery		
	c Force of blood against venous wall		
	d. Flow of blood through the heart		
9	A natient is having dyspneal to facilitate respiration the purse w	oul	d.
5.	a. Remove pillows from under the head	oui	
	b. Elevate the head end of the bed up to 30–45 degrees		
	c. Elevate the foot of the bed up to 30–40 degrees		
	d. Take the blood pressure immediately and on an hourly basis		
10.	In which area of the brain the temperature regulating center is	loca	ated?
	a. Cerebrum	b.	Cerebellum
	c. Hypothalamus	d.	Medulla oblongata

11.	In recording a blood pressure reading as 120/80 mm Hg, 120 re	ding a blood pressure reading as 120/80 mm Hg, 120 represents:			
	a. Pulse rate	b.	Diastolic pressure		
	c. Systolic pressure	d.	Pulse deficit		
12.	Temperature is highest when taken by:				
	a. Oral mode	b.	Rectum		
	c. Axilla	d.	Tympanic membrane		
13.	Temperature of the deep tissues of the body is termed as:				
	a. Surface temperature	b.	Core temperature		
	c. Body temperatu <mark>r</mark> e	d.	Normal temperature		
14.	which of the following patients, oral temperature can be taken:				
	a. 6-month-old infant	b.	Patient receiving oxygen		
	c. A 56-year-old healthy women	d.	An uncon <mark>s</mark> cious patient		
15.	With aging, blood pressure is often higher due to:				
	a. Loss of muscle mass	b.	Changes in exercise and diet		
	c. Decreased peripheral resistance	d.	Decreased elasticity in arterial wall		
16.	In the cold stage of fever, the temperature rises to:				
	a. Above 103°F	b.	Below 99°F		
	c. Above 100°F	d.	None of these		
17.	When a patient's temperature is recorded between 103° and 10	)5°F	, it is:		
	a. High pyrexia	b.	Pyrexia		
	c. Hyperpyrexia	d.	Mild pyr <mark>e</mark> xia		
Ans	wers to MCQs				

#### 1. d 2. d 3. a 4. a 5. c 6. b 7. d 8. b 9. b 10. c

11. c 12. b 13. b 14. c 15. d 16. a 17. a

Nursing Knowledge Tre

## UNIT 24

## Meeting Special Needs of the Patient

## (Care of Patients having Alterations in Body Functioning)

#### Learning Objectives

#### After completing this unit, you will be able to:

- Understand the meaning of key terms
- Assess unconscious patient
- Apply the special skills in clinical area while caring unconscious patient
- Understand the need of sensory impaired people
- Identify the mentally challenged case and provide appropriate nursing care

#### **Unit Outline**

- Assessment and Management of Unconscious Patient
- Unconsciousness
- Pathophysiology
- Immobility

- Functioning of Sensory Organs
- Mental State (Mentally Challenged): Assessment of Self-care Ability, Communication Methods and Special Considerations

#### Key Terms

- Glasgow Coma Scale: It is a scale used to determine the level of consciousness.
- Hearing impairment: Inability of an individual to hear sounds adequately, either partial or complete deafness.
- Mental retardation: MR is a disorder, characterized by significantly impaired cognitive functioning and adaptive behaviors with the onset before the age of 18.
- Pain: Unpleasant physical sensation due to sickness or trauma.
- Unconsciousness: This is an altered state of consciousness.
- Visual impairment: Any kind of vision loss, either partial or complete blindness.

#### ASSESSMENT AND MANAGEMENT OF UNCONSCIOUS PATIENT

#### Definition

"Unconsciousness is an alter state of consciousness."

An unconscious patient requires ongoing assessment. This includes the assessment of consciousness, respiration, pupillary science, motor responses, etc.

## The **Glasgow Coma Scale** determines the level of consciousness is given below (Fig. 1):

- Eye opening: Spontaneous-4 To sound-3 To pain-2 Never-1
- Motor response:
- To pain–2 Never–1 Obey command–6 Localize pain–5 Normal flexion–4 Abnormal flexion–3 Extension–2 Nil–1

	Eyes	Verbal	Motor
15	(+4) Spontaneous	(+5) Oriented	(+6) Obey
	(+3) To sound (+4) Confused	(+5) Localizing (+4) Normal	
ore		(+3) Words	flexion
Sc	(+2) To pressure	(+2) Sounds	(+3) Abnormal flexion (+2) Extension (+1) None
3	(1+) None	(+1) None	

- Verbal response: Oriented-5
  - Confused conversation-4 Inappropriate words-3 Incomprehensible sounds-2 None-1
- Fig. 1: Glasgow coma scale

#### **UNCONSCIOUSNESS**

Unconsciousness is a symptom rather than a disease. Degrees of unconsciousness that vary in length and severity:

- Brief
- Fainting
- Prolonged
- Coma

## Causes of Unconsciousness

#### Metabolic causes:

- Intoxication
- Drug overdose
- Alcohol overdose
- Hyponatremia
- Hepatic encephalopathy
- Hypoglycemia
- Hyperglycemia
- Meningitis
- Infection

#### Structural causes:

- Tumor
- Stroke hydrocephalus
- Brain contusion
- Epidural/subdural hematoma
- Trauma

#### PATHOPHYSIOLOGY (FIG. 2)



Fig. 2: Pathophysiology of unconsciousness

#### Signs and Symptoms

- Unresponsive to any stimulation
- Unaware of surroundings
- Drowsiness
- Inability to speak
- Unable to move body parts
- Loss of bowel or bladder control
- Stupor
- Abnormal pupil reactions
- Respiratory changes such as Cheyne-Stoke respiration, ataxic breathing, hyperventilation.
- Abnormal reflex reaction Initiative by CBS Nursing Division
- Changes Glasgow Coma Scale score

#### Assessment

- Glasgow Coma Scale
- Pupil size and reaction
- Vital signs
- Limb movement and tendon reflex, etc.

#### **Diagnostic Test**

- Blood test like CBC, LFT, RFT, ABG
- Magnetic resonance imaging (MRI)
- Computerized tomography (CT)
- CSF examination
- Lumbar puncture
- Positron emission tomography (PET)
- EEG, etc.

#### **Nursing Management of Unconscious Patient**

- Maintaining a patent airway:
  - ABC management
  - ABG analysis to evaluate the degree of oxygenation provided by the ventilators or oxygen.
  - Assess for cough and swallow reflexes
  - Tracheotomy or endotracheal intubation and mechanical ventilation, if necessary
  - Oronasopharyngeal suctioning
  - Dentures should be removed
  - Monitoring neurological signs at frequent intervals.
  - Ineffective cerebral tissue perfusion:
  - Assess the GCS, ICP, SPO<sub>2</sub> level and ABG of the patient.
  - Monitor the vital signs
  - Head elevation at 30 degrees
  - Administer medications as ordered.
  - Administer mannitol 25–50 g IV bolus, if ICP >20, as prescribed.
- Risk for increased ICP:
  - Head elevation at 30 degrees
  - Neutral position to be maintained to facilitate venous drainage
  - Suction the secretions
  - Pre-oxygenation before suctioning should be done.
  - Administer ordered sedation to limit the rise in ICP.
  - Restrict fluid intake and glucose to control cerebral edema.
- Fluid and electrolyte balance:
  - Intake-Output chart should be maintained.
  - Assess for fluid volume overload or deficit.
  - Administer medication to correct fluid overload
  - Over hydration and intravenous fluids with glucose are always avoided in comatose patients as that may increase cerebral edema. we by CBS Nursing Division
- Maintain proper positioning:
  - Lateral position with the support of pillows to maintain head in a neutral position.
  - Upper leg supported on a pillow to maintain alignment of the hip
  - Upper arm positioned on a pillow to maintain shoulder alignment.
  - Change position every 2–4 hourly.
  - Keep head end elevated at 30 degree to avoid aspiration.
- Maintain skin integrity:
  - Provide intervention for all self-care needs like oral care, bathing, hair care, skin and nail care, eye care, nasal care and back care.
  - Frequent oral hygiene every 4 hourly.
  - Comfort devices should be used for patient.
  - Positions should be changed frequently.
  - Air mattresses to be used.
  - Adequate hydration and nutritional status should be maintained.
  - Cornea should be kept moist by instilling methyl cellulose 0.5–1%.
  - Keep the lips moist with a water-soluble lubricant to prevent drying, cracking.

- Oral hygiene:
  - Airway should be removed when providing oral care.
  - Chlorhexidine based solution to be used for oral care.
  - Airway should be cleaned and then reinserted after oral care.
  - Provide oral care every 4 hourly to reduce the chance of infection.
- Eye care:
  - Assess patient for signs of eye irritation, drying, edema.
  - Clean the eyes with 0.9% sodium chloride to prevent infection.
  - Artificial tears eye drop can also be instilled to moisten the eyes.
  - Corneal damage can occur, if the eyes remain open for a longer period of time. Close the eyes with soft pad and tape.
- Impaired bowel/bladder functions:
  - Assess for constipation and bladder distention.
  - Auscultate bowel sounds.
  - Stool softeners or laxatives may be given as prescribed.
  - Catheter care should be done. Maintain intake output pH of the patient.
- Nutrition need:
  - Total parenteral nutrition (TPN).
  - Intravenous fluids are administered as ordered.
  - Feeding through nasogastric, nasojejunal or PEG tube.
- Risk for injury and contracture:
  - Side rails must be placed to prevent fall.
  - Adequate support must be given when moving or turning an unconscious patient.
  - Foot support should be provided.
  - Protect from external sources of heat.
  - Maintain the extremities in proper alignment and functional positions.
  - Provide passive ROM exercises every 4 hour.
- Provide sensory stimulation:
  - Talk to patient and explain about what is going on in surrounding or about him/her.
  - As hearing is the last sense to go. A nurse should communicate to an unconscious patient in every approach.
- Impaired family process:
  - Involve the family members in patient's care.
  - The family members should be allowed to stay with the patient.
  - Communicate and provide updates on patient condition to the family members.
  - Provide counseling to the relatives.

#### **IMMOBILITY**

#### Complications due to Immobility

- Neurological: Foot drop.
- Psychological: Anxiety, depression.
- Respiratory system: Pneumonia, pulmonary embolism.
- Cardiovascular system: DVT, postural hypotension, thromboembolism.
- **GI system:** Constipation, abdominal distention and paralytic ileus.

- **Urinary system:** UTI and stone formation.
- Musculoskeletal system: Osteoporosis, dystrophy and muscle weakness.
- Skin: Pressure sore

#### **Pupillary Signs and Eye Movements**

- Pupillary changes are associated with altered consciousness.
- In trauma coma—non-reactive pupils
- Metabolic coma—pupils are usually small, equal and reactive.
- Doll's eye phenomena, in which the eyes move left to right according to head movement.
- Roving eye movements in which the eyes rove around.
- Ocular roving, where the patient's eye seems to be slowly hopping up and down.

#### **Respiratory Pattern**

- Respiratory rate and depth
- Hyperventilation (neurogenic)
- Apneustic breathing
- Cheyne-Stokes respiration
- Ataxic breathing
- Arterial blood gas analysis

#### **Motor Response**

- Paralysis of one part (monoplegia)
- Paralysis of one side of the body (hemiplegia)
- Complete or partial paralysis in both legs and, in some people, parts of the lower abdomen (paraplegia)
- Loss of movement and sensation in all four limbs (tetraplegia/quadriplegia)

Vital signs: Hyperthermia or hypothermia may occur.

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#### Nursing Intervention for the Unconscious of Patient

Unconscious patient are completely dependent, as protective reflexes are impaired and spontaneous movements are lost.

- Life saving measure like supporting circulation and ventilation.
- Assess the patient level of consciousness.
- Protect from aspiration.
- Protect from skin breakdown due to prolonged pressure.
- Assure safety and rights of the patient.
- Provide all basic self-care needs to patient including bathing, hair care, skin care, nail care, eye care, etc.
- Administer nutrition and fluid electrolyte through nasogastric tube feeding or IV infusion.
- Meet the elimination need of the patient, keep the skin clean and dry to prevent skin breakdown, infection and bed sores.
- Maintain body alignment with the use of comfortable devices.
- Protect from injuries and environmental changes.
- Involve family members in the care.

#### FUNCTIONING OF SENSORY ORGANS

#### Visual Impairment—Assessment

Through assessment we are able to understand the need of a visually impaired person. Plan for the care for the people who will need help for self-care and assist them to become more independent for their self-care (Fig. 3).

- Encourage them to use the **touch and follow technique** and a walking stick to guide them.
- Provide rehabilitation care and support to improve quality of life.
- Help them to regain self-sufficiency in the daily living activities and self-grooming.
- Guide the blind person to access a library for books, magazines and newspapers in braille, audio tapes.
- Provide guidance for special school for their education.
- The person can mentally visualize of the object and consistently guide with the same settings.
- Hold the persons hand and guide the fingertips to the place describing where the food is located, etc.

A visually impaired person can learn how to increase the usefulness of their remaining senses. This helps them to communicate effectively with others as they cannot see the face and non-verbal cues.

They are more sensitive to spatial perceptions and the air in the room. Changes in the volume of sound may help them to navigate their path to walk. Some are suited to having a dog.

#### **Hearing Loss**

Hearing loss has a great impact on communication. Hearing loss affects many people.

#### Assessment of Hearing-impaired Person

Hearing acuity is assessed by testing a person's ability to hear. Hearing impairment occurs in varying degree. They are as follows (Fig. 4):

- **Slight**: The patient may only have difficulty with hearing low volume speech.
- Mild: Patient of this category may understand conversational speech, when face to face, but they may miss the conversation, if voice is dull.



Fig. 4: Hearing impairment



Fig. 3: Eye examination

- **Marked loss**: These types of patient's only understand loud conversation. A child with marked hearing loss will have limited vocabulary.
- Severe loss: The patient with severe hearing loss will only hear loud vowels and may be able to understand and discriminate vowels, but not all consonants. Those with severe hearing loss are described as deaf.

#### **Communication Method**

Those who have impaired hearing:

- Need special seating and lighting arrangement.
- Lip reading instruction are needed.
- Auditory training is needed.
- Special guidance requires for language development.
- Provide special school for concept development, lip reading, language skill and speech.
- Hearing acuity is assessed by testing a person's ability to hear your whispered or spoken voice or the ticking of a watch.

#### Indication of Hearing-impaired Person

- Excessive loudness or softness of speech.
- Abnormal awareness of sound.
- Looks disorientation.
- An unrealistic distrust of others (Paranoia).
- Lack of response when talking.
- Frequent asking for clarification while communicating.
- Stressed facial expression while listening.

#### MENTAL STATE (MENTALLY CHALLENGED): ASSESSMENT OF SELF-CARE ABILITY, COMMUNICATION METHODS AND SPECIAL CONSIDERATIONS

#### Definition

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"Mental retardation is a generalized disorder, characterized by significantly impaired cognitive functioning and adaptive behaviors with the onset before the age of 18. IQ Score under 70".

Intellectual disability (ID), also termed as intellectual development disorder (IDD) and formerly called mental retardation (MR).

#### **Types of Mental Retardation**

It is classified depending upon IQ level:

- Mild (educable) 50–70
- Moderate (trainable) 35–50
- Severe (dependent retarded) 20–35
- Profound (life support) <20

#### Mentally Challenged Behavior Management (Fig. 5)

- Monitoring the child's developmental needs and problems.
- Provide training to the child for basic skills, such as bathing and feeding.
- Programs that maximize speech, language, cognitive, psychomotor, self-care, and occupational skills.



Fig. 5: Mentally challenged child's behavior

- Continuous evaluation for any psychiatric disorders, such as bipolar disorder.
- Early intervention programs for children younger than three years with mental retardation.
- Vocational training and environment supervision.
- Family therapy to help parents develop coping ability and skills.

## Prevention Nursing Knowledge Tree

#### Primary prevention:

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- Preconception phase:
  - Genetic counseling.
  - Adequate maternal nutrition.
  - Immunization for maternal rubella.
  - Blood tests to identify the presence of venereal disease.
- Prenatal phase:
  - Provide adequate nutrition to the mother and fetal monitoring.
  - Rule out the possible genetic disorder by amniocentesis, fetoscopy, ultrasound and fetal biopsy, if indicated.
  - Avoidance of teratogenic substances like exposure to radiation and consumption of alcohol and drugs.
- At birth:
  - In cases of high-risk pregnancy, the delivery has to be conducted by an expert team.
  - Apgar scoring done at 1–5 minutes after the birth of the child.
- Childhood:
  - Proper nutrition throughout the developmental period and particularly during the first 6 months after birth.
  - Dietary restriction for specific metabolic disorders until no longer needed.

• Avoidance of hazards in the child's environment to avoid brain injury from causes such as lead poisoning, ingestion of chemicals, or accidents.

Secondary prevention: Early recognition of mental retardation helps in early rehabilitation.

**Tertiary prevention:** It includes rehabilitation in physical and vocational training as per the level of challenged. Rehabilitation provides optimal functioning in a child with mental retardation.

#### Rehabilitation of Mentally Disabled Child

- The prevention and early detection of mentally handicaps.
- Regular assessment of the mentally retarded person.
- Advice and support to the family.
- Provide education, training, guidance, appropriate for each handicapped person.
- Nursing management.
- Assess the factors causing developmental delay.
- Monitor the patterns of growth (height, weight, head circumference and refer to a dietician to obtain nutritional intervention).
- Monitor the child for physical or emotional distress.
- Give repetitive and simple instructions.
- Improve communication, verbal and tactile stimulation.
- Boost the communication with the outside world, e.g., newspapers, television, clock, etc.
- Identification and use of educational training to facilitate child development.
- Instruct and demonstrate self-care skills.
- Provide a safe and comfortable environment. Ambulate child with assistance.
- Assess the child's strengths and abilities to develop a plan of care to maintain and enhance capabilities of child.
- Teach the child adaptive skills, such as eating, dressing, and toileting.

#### Nursing Knowledge Tree

#### **ASSESS YOURSELF** (University Pattern Questions)

#### **Short Answer Questions**

- 1. What should be the nursing care of an unconscious patient?
- 2. What do you understand by the non-pharmacological management of pain?
- 3. Mention the nurses' role in taking care of visually impaired person.
- 4. Write down the nursing intervention to promote sensory functions.

#### **Long Answer Questions**

- 1. Describe the Glasgow coma scale with different levels and measurement of consciousness.
- 2. How a nurse will assess the self-care ability of mentally challenged patient?

#### **Multiple Choice Questions**

- 1. What position should not be used for a patient who is unconscious?
  - a. Lateral
  - b. Sims
  - c. Fowlers 90°
  - d. Prone
- 2. What is the major effect of hearing loss?
  - a. Impact on communication
  - b. Inability to develop relationships
  - c. Problem with academic success
  - d. Inability to participate in extracurricular activities
- 3. Which of the following is an example of an intellectual disability?
  - a. Dyslexia
  - b. Mental Retardation
  - c. ADHD
  - d. Autistic disorder
- 4. What is the minimum score of Glasgow Coma Scale?
  - a. 3
  - b. 5
  - c. 7
  - d. 10

#### **Answers to MCQs**

1. c 2. a 3. b 4. a

Nursing Knowledge Tree An Initiative by CBS Nursing Division

## Principles & Procedures of NURSING FOUNDATIONS

(Covers Theory part as per the Revised INC Syllabus)

#### **Salient Features**

- The whole compendium is developed in accordance with the Revised INC Syllabus
- All the theoretical concepts have been covered extensively in this volume with a very unique approach
- Simple and lucid language has been used throughout the book for better and easy understanding of the concept
- 300+ figures, illustrations, tables have been supplemented with the text for quick understanding
- The book has been organized in a logical sequence and is systematically framed to augment the learning
- · Clinically applied aspects have been covered throughout the book extensively
- Unit Outline provides a glimpse of topics discussed in the uni
- University pattern questions have been covered under Assess Yourself Section at the end of every unit
- Last but not least, each chapter has a standard format starting with Learning Objectives, Unit Outlines and Key Terms and Chapter Outline, followed by the procedures.

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