NURSING ASSISTANCE

JSS KARNATAKA OPEN SCHOOL
No. 5, 5th main, Basaveshwara Block,
Teacher's Layout,Yaraganahally Extension,
Mysore -11

In Collaboration with
COMMON WEALTH EDUCATIONAL MEDIA CENTRE FOR ASIA (CEMCA) NEW DELHI

ADVISORY COMMITTEE

Sri Chidre Shankarayya Swamy,
Director,
General Education,
JSS Mahavidyapeetha, Mysore

Dr. Ramesh Chandra Sharma
Director, CEMCA
New Delhi

Sri B.R. Umakanth,
Joint Director(Projects),
JSS Mahavidyapeetha,
JSS Technical Institutions Campus, Mysore

Dr. Manas Ranjan Panigrahi
Programme officer
CEMCA, New Delhi

Dr.C.K.Renukarya
Retired Professor
University of Mysore,
Mysore

CURRICULUM COMMITTEE & LESSON WRITING

Prof. Sheela Williams,
Principal, Nursing College,
Saraswathipuram, Mysore

Prof. Jyothi Ammal Loganathan
Principal,
JSS Nursing College,
Chamarajanagar

Dr. Kavitha Raja
Principal, JSS College of Physio-therapy,
JSS Hospital, Mysore

Prof. Anitha Victoria Norosha
JSS Nursing College,

Prof. Nisha P Nair
Faculty, JSS Nursing College,
Sarswathipuram, Mysore

Dr. Jyothi Bala Chauhan,
Professor and Head,
DOS in Biotechnology
PBMMECPG wing SBRRMFGC
KRS Road , Metagalli, Mysore

Dr. Suman K. Murthy
Dept. of Social work
PBMMEC PF wing SBEE MFGC,
Mysore

Dr. Smitha Grace S.R.
Dept. of Biotechnology
PBMMEC PG wing SBRR MFGC,
Mysore

Dr. Prathibha
Department of Meicine,
JSS Hospital, Mysore

CONTENT EDITORS

Sri. M.V. Naganna
#155/B Chandrshekarar road, BEML, III street, Rajarajeshwari Nagar, Banglore

Dr. Chellarani Vijaykumar
#123, Annaitheresa, 2nd Street, Sathuvachari phase III, Vellore, Thamilnadu 620009

Dr.Cletus D' Souza
Emiritus Professor
Dept. of Biochemistry
Manasagangothri, mysore

Dr. Indira Jayaprakash
Retired Professor
Bangalore University
Bangalore

LANGUAGE EDITOR

Prof. S. Mallanna
Retired Professor
JSS College, Saraswathipuram,
Mysore

Sri. H.M.Mahalingappa
Associate Professor
JSS Autonomous College,
Ooty Road, Mysore.

Co-ordinator

Dr. K.M. Veeraiah
Director,
JSS Karnataka Open School, Mysore

Co-co-ordinator

Sri R. Nagarajachar
Deputy Director,
JSS Karnataka Open School,Mysore

Module -1

Nursing Assistance

Contents

NURSING ASSISTANCE

1

INTRODUCTION TO NURSING ASSISTANCE

Structure

MODULE-1

Introduction to Nursing Assistance

1.0 INTRODUCTION

Health is very important for every individual living on this earth .Life expectancy having risen all over the world,it is of concern of every community to be able to look after its elderly population and to educate them for a healthy and active aging. India is facing problem as its elderly population is increasing tremendously, with a current estimate of 90 million over the age of 60. India's 60th National Sample survey shows that almost a quarter of the elderly persons report poor health. Under its eleventh Five – year plan, the Indian government has granted social security support for health care and welfare for its elderly citizens.

Morbidity patterns of the elderly, their epidemiological features and meeting the health care needs of the elderly with reliance on family-based and human based care, are integral points of the Health for All concept.

1.1 OBJECTIVES

After completing this unit, you should be able to

- state the concept of hospital
- explain what is home care and a client's unit
- describe the objectives, functions, scope and limits of home care nursing
- state how you would manage available resources
- explain the health care delivery system

1.2 CONCEPTS OF HOSPITAL

A hospital is a health care institution providing patient treatment with specialized staff and equipment.

Hospitals are funded by the public sector by health organizations (for profit or nonprofit), by health insurance companies or by charities. Historically, hospitals were founded and funded by religious orders or charitable individuals.

1.2.1 Types of Hospital

Patients go to the hospital for diagnosis, treatment or therapy. Some consult, take therapy and leave (out patients) without staying overnight,

while others are admitted and stay overnight or for several days or weeks or months (inpatients).

- **General –** General hospital is set up to deal with many kinds of diseases and injury, and normally has an emergency department to deal with urgent and immediate threats to health.
- **District –** A district hospital is typically the major health care facility in its region, with a large number of beds for intensive care and long term care. These hospitals provide health care to un insured patients and also to patients with health insurance.
- **Specialized –** Types of specialized hospitals include trauma centres rehabilitation hospitals, children hospitals, seniors (geriatrics) hospitals, and hospitals for dealing with specific medical needs such as psychiatric problems, certain disease categories such as cardiac, oncology or orthopedics problems. These hospitals are affiliated with universities or medical colleges for teaching and research purposes. Eg.Narayana Hrudayalaya's Bengaluru cardiac unit.
- **Teaching –** A teaching hospital combines assistance to people with teaching to medical students and nurses and often is linked to a medical school, nursing school or university.
- **Clinic –** Patients are treated on day basis and they are not admitted overnight. Their medical conditions are not urgent or life threatening.

1.2.2 Home care

Home care also referred to as domiciliary care, social care or inhome care is supportive care provided in the home. Care may be provided in the home. Care may be provided by licensed health care professionals or by assistants who are not licensed but trained to provide daily care to help ensure the activities of daily living (ADL) are met.

Care assistants may help the individual with daily tasks such as bathing, eating, cleaning the home and preparing meals.

1.2.3 Clients unit

The client/patient's room should be comfortable and homely. Patients must be encouraged to personalize their rooms. Privacy should be respected.

Environment should be clean and hygienic. Their clothing, their belongings and their surroundings should be clean. The care taker should be clean and well groomed. There should be no strong or unpleasant odours. Plenty of non-glare lighting, minimal noise, plants, comfortable furniture and pets contribute to a friendly environment.

The patient's unit should be modified to meet the needs of the elderly/ child. There is need for comfort, safety, nutrition/hydration, and skin integrity. Older adults especially are at a greater risk for falls, acquired infections due to reductions in immune system response, risk for becoming incontienent of urine, cognitive impairment, etc.

Therefore the patient's unit must be fitted with the necessary equipment for easy movement and meeting their basic needs. Equipment like walker, side rails on the bed, back rest, comfortable armchair, modified feeding utensils, equipment for elimination needs, etc. are essential.

1.3 AIM, FUNCTIONS, SCOPE AND LIMITATIONS OF NURSING ASSISTANCE

Ageing is a normal, universal, progressive, irreversible process. It is an inevitable physiological phenomenon. An increasing number of people are adversely affected by the process of ageing, multiple pathology and the social changes associated with growing old and develop a need for care, treatment and support.

1.3.1 Aim

The important aim of home care assistance is to assist the elderly person to live as independently as possible and to achieve a reasonable quality of life which is acceptable to the individual.

1.3.2 Functions

The functions of a nursing assistant include

- Assisting professional workers in medical and psychological assessment
- Performing wound care
- Provideing medications and treatment and evaluating response
- Maintaining hydration, nutrition, aeration, comfort of the elderly.
- Assisting in physical and rehabilitative therapy
- Informing doctor of any change in patient's condition

1.3.3 Scope of Nursing Assistance

Some of the settings where the nursing assistant can practice include the following:

- In acute, community or long term care environment
- For elderly patients both bed fast (bedridden) and ambulatory
- Home health care agencies, wellness clinics and nursing homes

1.4 ORIENTATION TO HEALTH CARE DELIVERY SYSTEM IN INDIA

Health care delivery system is represented by five major sectors or agencies in India. They are:

- Public Health Sector
- Private Health Sector
- Indigenous Systems of Medicine
- Voluntary health Agencies
- National Health Programmes

1.4.1 Public Health Care

Public health care agency is the government agency which provides health care facilities to especially the people of rural India. They are:

A. Primary Health Care

- Primary health care centres
- Sub centres

B. Hospitals / Health Centres

- Community health centres
- Rural hospitals
- District hospitals/ health centres
- Specialist hospital
- Teaching hospitals

C. Health Insurance Schemes

- Employees State Insurance
- Central Government health schemes

D. Other Agencies

- Defense Services
- Railways

Primary health care in India starts at the village level, sub centre level and primary health centre level. Care is delivered by village health guides, trained local dais, and ICDS scheme and anganwadi workers.

The functions include

- Education on health problems and the methods of preventing and controlling them
- Promotion of food supply and proper nutrition
- An adequate supply of safe water and basic sanitation
- Maternal and Child health care
- Immunization against major infectious diseases
- Prevention and control of locally endemic diseases
- Appropriate treatment of common diseases and injuries
- Provision of essential drugs
- National Health Programmes
- Referral services
- Training of health guides, health workers, local dais and health assistants.

In India, at present, Health Insurance is limited to industrial workers and their families. Central government employees are covered by health insurance. The ESI scheme was introduced in 1948. It covers employees with salaries less than Rs 15000/-. ESI scheme provides for medical care in cash and kind, benefits in the contingency of sickness, maternity, employment injury and pension for dependents on death of a worker due to employment injury. Many state governments and private institutions offer their own health insurance.

1.4.2 Private Health Care

This agency provides health care facilities to all people. A minimum fees is charged for the care provided. This includes

- Private Hospitals, Polyclinics, Nursing homes and Dispensaries.
- General Practitioners and clinics

Private agencies are highly unorganized and concentrat on urban areas. They provide mainly curative services.This includes private hospitals

and independent clinics.Medical Council of India (MCI) and Indian Medical Association (IMA) regulate some functions and activities.

1.4.3 Indigenous Systems of Medicine

This is the ageold systems of medicine of ancient India which are still widely practiced. The indigenous systems of medicine in India include

- Ayurveda
- Siddha
- Unani and Tibbi
- Homeopathy

They provide bulk of medical care to rural people. Some of institutions are
National Institute of Ayurveda
National Institute of Homeopathy

1.4.4 Voluntary Health Agencies

Voluntary health agencies are nonprofit registered health agencies. They are people centred and support innovative health and development programmes at grass root levels, with active participation of the people. They offer cost effective, preventive, promotive and rehabilitative services.

***Eg*:** Indian Red Cross Society, Bharat Sevak Samaj

1.4.5 National Health Programmes

The National Health Programmes are initiated by the Government of India to prevent diseases that spread in endemic areas.

Eg: National Malaria Eradication Programme, National Filaria Control Programme etc.

1.5 SUMMARY

In this unit you are introduced to the concept of hospital and home care assistance. We have discussed the scope and functions of the Nursing assistants.

The different types of hospitals include public and private sectors. You also learnt about the ancient systems of medicine in India. The content discussed so far will help you to understand how health care are provided to the people and where you as a nursing assistant fit in.

1.6 SELF-ASSESSMENT QUESTIONS

1. Fill in the blanks

- A hospital is a_____providing patient treatment with specialized staff and equipment.
- The important aim of home care assistance is ———————

2. List the different types of hospitals.

_____

_____

3. State three functions of a Nursing assistant.

_____

4. List the different indigenous systems of medicines in India.

_____

_____

5. List at least five functions of primary health care.

_____

_____

1.7 GLOSSARY

1.8 SUGGESTED READINGS

- Francis. C M : Hospital Administration
- Davies. RL, Macaulay HMC : Hospital Planning and Administration (ed -1, 1995, Jaypee brothers. Newdelhi.

1.9 REFERENCES

- Potter. PA, Perryth : Fundamentals of nursing (ed-5) Noida 2001, Elsevier.
- Park K : Text book of Preventive and Social medicine (ed 22), Jabhalapur. Banarsidas Bhanot, Jabhalapur, 2014.

NURSING ASSISTANCE

2

COMMUNICATION SKILLS

Structure

2.0 INTRODUCTION

Communication is the basis for all human interactions and for all group functioning. The word communication is derived from the Latin word 'Communicare', which means to participate, to inform or impart. It has been suggested that about 70% of the active human beings' life on the job is spent in communication with others. Our lives are filled with one communication experience after another. This kind of communication uses various methods such as talking, listening, writing and reading. However painting, dancing and storytelling are also methods of communication. In addition, thoughts are conveyed to others not only by spoken or written words but also by gestures and body actions.

We shall now proceed to enumerate the characteristics of communication, process of communication, therapeutic communication, assertive communication, tips for effective communication and communication with people with special needs. Communication is essential for smooth social functioning.

2.1 OBJECTIVES

After studying this unit, you should be able to

- define communication
- describe the process of communication
- list common barriers to communication
- explain what is therapeutic relationship and therapeutic communication
- explain how to apply the tips of effective communication
- list the techniques of assertiveness
- explain how to communicate effectively with people with special needs.

2.2.1 Definition

Communication is the process of sharing and exchanging of information, ideas/views among people.

According to Webster's Dictionary "Sending, giving or exchanging information and idea is communication".

Communication in very simple terms can be defined as the process of passing messages, ideas, facts, opinions, information from one person to another.

For the purpose of communication, there has to be a source of communication or a "sender" and a "receiver" who will receive the communication and the "message or the content" which the sender wants to send to the receiver.

In short Communication can be defined as, " the transmission and receiving of information, feeling and/or attitudes with the overall purpose of being understood by the other and elicit a response"

From the above discussion it is clear that.

1. Communication essentially is a two way process.
2. If the receiver does not understand and/or respond to the message of the sender, communication is ineffective.
3. Communication involves interaction and is a continuous process with clients
4. Communication pervades (spreads) all spheres of activities.

Let us analyse what the purpose of communication is

2.2.2 Purposes of communication

1. Communication is essential to deal with our clients, their families, doctors, social workers, etc.
2. For efficient patient care.
3. For obtaining information from family, clients, our colleagues and other people.
4. To receive reports from other people about our clients and send the same to the referral systems.
5. To make a good and prompt report about our client for better care. All this requires a great amount of communication skills. You can also see that communication is a two way process as well as a multi dimensional process.

2.3 COMMUNICATION PROCESS

Communication is a continuous and dynamic process. We may influence another through written or oral languages, gestures, facial expressions, music, painting, sculpture, drama, dance or other means. Human communication is an ongoing series of events in which meaning is generated and transmitted. For effective communication the meaning acquired by the person listening must be similar or identical to the message intended by the speaker. Interpersonal communication (i.e. communication between people) is not only a two way process but also a multi-dimensional and multi stage process.

2.3.1 Elements of Communication

From the above discussion it should be clear to you that any communication should have the following elements:

1. Communicator (Sender)
2. Encoding
3. Message
4. Medium
5. Decoding
6. Receiver
7. Feed back

All these seven essential features are shown schematically below:

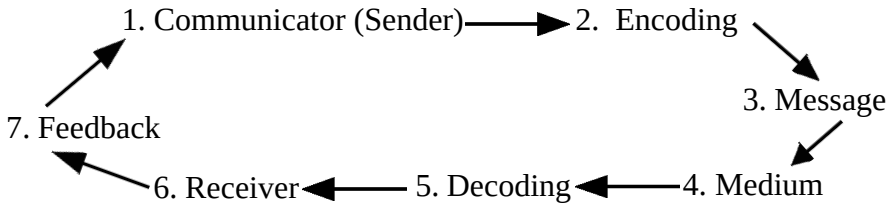

Fig : 2.1 Elements of Communication

These elements constitute the process of inter personal communication. We shall briefly discuss each element one by one.

1. Sender or Communicator

Sender is the person or source from where communication originates. Communication begins in the mind of a sender. When a person wishes to

convey an idea, emotion or thought to the other person, communication begins.

The sender can be a person, a group of persons or even a non human being like a machine e.g cardiac monitor in I.C.C.U.

2. Encoding

Encoding means preparing the information in a suitable language that will be understood by the receiver. Once the sender has the message to be transmitted to the receiver, the message has to be put in the form of symbols. The process of transforming thoughts and ideas into symbols is called encoding.

The symbol can be verbal or non verbal. The means for the verbal and written messages would be words and languages . Whereas for the non verbal, it would be facial expressions, postures and smile etc.

3. Message

The encoded message is required to be transmitted appropriately, verbally or in writing.

4. Media

Media are the means of conveying the message. Once the message has been thought of and encoded it has to be passed to the receiver using one medium or more. The medium could be a letter, telephone, face to face conversation, video and audio cassette and CDs The choice of medium usually depends on the nature, importance and urgency of the message. For communication to be effective the medium used should be appropriate for the message as well as for the receiver.

5. Decoding

On receiving the message three processes take place in the receiver. They are

- Recognition of the message
- Perception of the message
- Comprehension of the message

We shall discuss each one of these briefly

The receiver of the message has to first recognize the message in order to respond to it .The process of recognizing and perceiving the message goes on side by side. This is known as decoding by perception. We mean here that the receiver interprets and translates it into thoughts that attach a

meaning to it and categorizes the information and tries to associate it with previous memories of similar categories.

6. Receiver

He/She interprets the information according to his/her memories, emotional status, attitudes, values, needs,expectations and desires. Finally the receiver comprehends the message, gets the meaning of the message and understands it.

Communication is successful when the message has been received and understood the way the sender desires.

7. Feed back

The last step of the process of communication is feedback and response. Usually if a receiver has received or been activated in some way by the message, he/she gives some sort of a response or feedback.

Through feedback, the sender comes to know whether his message has been correctly received and understood.

Normally the aim of a communication is to elicit the desired response. Communication may produce any of the following three responses :

1. A desired response may occur (in the above example, cleaning the neighbourhood)
2. No response may occur (people may ignore the message)
3. An undesirable response may occur (they may neglect cleanliness)

A communication is successful and effective when a desired response is produced. Now we have understood the elements of communication.

2.3.2 Barriers to Communication

Obstructed or faulty communication can lead to undesired results. Hence it is necessary to know the barriers of communication.

1. Physiological such as difficulties in hearing, speaking
2. Psychological emotional disturbances, low levels of intelligence, and difficulties with language or comprehension.
3. Environmental noise, congestion, inability to see the sender
4. Social and cultural factors such as illiteracy, customs, beliefs, attitudes, economic and social class differences.

2.3.3 Types of Communication

There are several types of communication. They are

- **One way communication :**
  The flow of communication is 'one way' from the communicator to audience. For example, a teacher giving a lecture to students.
- **Two way communication:**
  Here both the communicator (sender) and the audience (receiver) take part. The audience may raise questions and add their own information, ideas and opinions to the subject.
- **Verbal communication:**
  The traditional way of communication has been through words.
- **Non-verbal communication:**
  Communication can occur even without words. It includes a whole range of bodily movements, postures, gestures, facial expressions and photographs (e.g smile, raised eye brows, frown, staring etc). Silence is also a form of non verbal communication. It can speak louder than words.
- **Formal and informal communication:**
  Formal communication is official conversation.
  Informal communication is casual conversation.
- **Visual communication:**
  The visual form of communication comprises charts and graphs, pictograms, tables and maps etc
- **Telecommuincation and internet:**
  Telecommunication is the process of communicating over distance by using electromagnetic instruments for the purpose.

2.4 THERAPEUTIC RELATIONSHIP

Therapeutic communication is an interpersonal interaction between the nurse/care taker and the patient/ client. Here the nurse/care taker focuses on the client's specific needs to promote an effective exchange of information. It is needed for effective care giving.

A relationship is defined as a state of being related or a state of affinity between two individuals.

The nurse and the client interact with each other in the health care system to assist the client to use personal resources to meet his or her unique needs.

The interaction is purposefully established, maintained and carried out to help the client gain new adaptation skills.

Now let us see the phases of Therapeutic relationship

2.4.1 Phases of a Therapeutic Nurse Client Relationship

Four phases of relation process have been identified.

1. Pre interaction phase
2. Introductory or orientation phase
3. Working phase
4. Termination phase

- **Pre interaction Phase**

This phase begins when the Nursing assistance is assigned to initiate a Therapeutic relationship.

The Nurse's functions in the pre-interaction phase are,

a. Explore own feeling, fears and ideas etc.
b. Analyze own professional strengths and limitations.
c. Gather data about client from all sources.
d. Plan for the first meeting with the client.

- **Introductory or Orientation Phase**

During introductory phase the nursing assistant meets the client for the first time.

Nurse's Functions in the orientation phase are,

a. Establish rapport, trust and acceptance.
b. Establish communication. Assist in the verbal expression of thoughts and feelings.
c. Gather data including the client's feelings, strengths and weaknesses.
d. Define client's problems, set priorities for nursing interventions.
Set mutually agreed goals

- **Working Phase**

Most of the therapeutic work is carried out during the working phase.

Nurse's Functions in the working phase are,

a. Gather further data, explore relevant efforts.
b. Promote client's development of insight and use of constructive coping mechanisms.
c. Facilitate behaviour change, encourage him/her to evaluate the results of his/her behaviour
d. Provide him/her with opportunities for independent functioning.

Evaluate problems and goals and redefine as necessary

- **Termination Phase**

This is the difficult but most important phase of the therapeutic nurse client relationship. The goal of this phase is to bring a therapeutic end to the relationship.

Nurse's Functions in the termination phase are

a. Establish reality of separation- gradually end the relationship.
b. Mutually explore feelings of rejection, loss, sadness, anger and related behaviour
c. Review progress of therapy and attainment of goals.
d. Formulate plans for future meeting if needed

Now let us discuss the therapeutic communication

2.4.2 Techniques of Therapeutic Communication

Therapeutic communication helps to form a working relationship and fulfill the purpose of giving effective nursing care .The communication is not casual. It is a planned and deliberate professional act.

There is no formula for forming a relationship with a client. Each person communicates uniquely and each client requires different communication techniques .The home care assistant should be flexible in techniques used to foster communication with individual clients. Some common techniques or given in the next page.

The nurse must establish **rapport** with the client and have an **empathetic** approach and show **warmth** towards the client and should be **genuine** in rendering health care.

Sl.No	Techniques	Description	Illustration
1)	Listening	It is an active process of receiving information	By eye to eye contact, nodding, gestures etc.
2)	Broad openings	Encourage the client to select topic for discussion	"Tell me what are you thinking about "
3)	Restating	Repeat the main thought expressed by the client	"You said that you are having difficulty in hearing ".
4)	Clarification	Encourage the unclear thought to speak out	"Tell me what do you mean"
5)	Reflection	Directing back the client's ideas, feelings, questions and content	"You feel tense when you think of your son "
6)	Humour	Comic enjoyment brings energy to clients	Joke depending up on situation
7)	Informing	Skill of giving more information to clients	"I think you need to know more about your medications"
8)	Focusing	Asking more questions about a particular topic	"Tell me more about your pain in your knee"
9)	Sharing perception	Verify your understanding of what the client is thinking or feeling	"I feel that you are angry even though you are smiling".
10)	Theme identification	It includes identification of problem faced (issues) during the course of nurse-client relationship or any other incident.	"I feel that you are hurt by my words" or " The smell of that particular perfume irritates you"
11)	Silence	Lack of verbal communication for therapeutic reason	Give time to the client to think and collect information and then start conversation
12)	Suggestion	Presentation of alternative ideas for the patients consideration	You can change your way of preparing food depending on your likes and dislikes.

2.5 ASSERTIVENESS

Assertive behavior promotes a feeling of personal power and self confidence. These two components are commonly lacking in clients with emotional disorders. Becoming more assertive empowers individuals by promoting self esteem without diminishing the esteem of others.

2.5.1 Definition

Assertive behaviour helps us to feel good about ourselves and increases our self esteem. It helps us to feel good about other people. It increases our ability to develop satisfying relationships with others. It is accomplished out of honesty, directness, appropriateness and respecting one's own basic rights as well as the rights of others. Assertiveness is not aggressiveness.

2.5.2 Characteristics of assertive behaviour

- Eye contact : Avoid staring but keep intermittent eye contact for effectiveness
- Body posture : Standing with erect posture or sitting and leaning slightly towards other person shows assertiveness
- Distance : Distance of physical contact represent intimacy. It depends on culture also. A distance more than 18 inches is ideal for casual communication.
- Gestures : Gestures helps for emphasis, warmth, depth or power of spoken word
- Facial expression : Facial expressions like smile, surprise, anger, fear etc add up assertiveness to communication.
- Voice : Loudness, Softness, degree and placement of emphasis conveys the messages.
- Fluency : Avoid pauses like ' uh', 'You know', 'and' etc. Flu ency shows knowledge and clarity.
- Timing : Assertive response are more effective when they are spontaneous and immediate.
- Listening : Proper eye contact and nodding shows the responses.
- Thoughts : It is based on the attitude of an individual. Positive thoughts followed by a positive attitude will give good results.
- Content : Make sure that 'how' a throught is communicated is as emportent as 'What' is communicated

2.5.3 Techniques that promote assertive behaviour

The following techniques have been given to be effective in responding to criticism and avoiding manipulation by others.

1. Standing up for one's basic human rights
2. Assuming responsibility for one's own statement

3. Repeating in a calm voice what is wanted (broken record technique)
4. Admitting when an error has been made by you.
5. Seeking additional information about critical statements when needed.
6. Shifting from content to process, Changing the focus of the communication from discussing the topic at hand to analyzing what is actually going on in the interaction.
7. Clouding /fogging- agreeing with the critic's argument without becoming defensive and agreeing to change.
8. Defusing - putting off further discussion with an angry individual until he or she is calmer
9. Delaying - assertively putting off further discussion with another individual until one is calmer
10. Responding assertively with humour.

Assertive thinking is sometimes inhibited by repetitive negative thoughts of which the mind refuses to let go. Individuals with low self esteem may be reduced with thought such as 'I am useless' 'nothing seems to be right'. This type of thinking fosters the belief that one individual's rights do not deserve the same consideration as those of others and reflects on assertive communication and behavioural response. There are several methods such as "thought stopping" to overcome such negative thoughts.

2.6 TIPS FOR EFFECTIVE COMMUNICATION

The individuals and groups can be motivated towards health protection by using communication skills. Tips for effective communications are as follows

1. Systematic analysis of message i.e. the idea, the thought to be communicated so that one is clear about it.
2. Selection and determination of appropriate language and medium of communication in accordance with the purpose of each communication.
3. The timing, physical setting and environmental climate for communication need to be appropriate to convey the desired meaning of communication conveyed by words.
4. Consultation with others for planning of communication.
5. The basic content and overtones of message as well as the receptive-

ness to the viewpoint of the receiver influence effectiveness of communication .

6. The message should convey something of value to the receiver in the light of his needs and interest whenever possible.
7. Feedback from receivers , that is the follow up of communication through expression of the receiver's reactions and their performance review help in effective communication.
8. Communication while meeting the needs of immediate situations should be consistent with long term goals and interest of the clients.
9. The Communicator's action following a communication is important. Action speaks more than words.
10 The sender has to understand the receiver's attitude and reaction by being alert and proper listening to ensure that the desired meaning of the message has been comprehended by the receiver.

2.7 COMMUNICATION WITH PEOPLE WITH SPECIAL NEEDS

The communication process in general is complex.It can be further complicated when the client is having special needs. Communication comes in different forms including verbal spoken, written word, lip reading, sign language and even body language.

The person you are caring for may develop communication issues as a result of a physical condition such as hearing difficulties or visual impairment. It may be due to a condition affecting the brain such as Alzheimer's disease or stroke. These communication problems may come on gradually or could happen overnight , leaving you unprepared and unsure about how best to communicate with the person you are caring for.

If a person's hearing or sight is impaired, then body language or tone of voice will become more important . Both care taker and care receiver may learn new skills to communicate such as sign language or lip reading.

If a condition or impairment develops suddenly, you'll need to re-evaluate your methods of communication with that person.

It might feel strange at first but you might need to consider your tone of voice, how you speak and how you use your body language and gestures to emphasis what you are saying .It's a good idea to express this to

the person you care for and find out what helps them to makes your communication clear.

General communication tips to communicate with people with special needs

1. Allow extra time for older patients.
2. Minimize visual and auditory distractions.
3. Sit face to face with the patient.
4. Don't underestimate the power of eye contact.
5. Listen without interrupting the patient.
6. Speak slowly clearly and loudly.
7. Use short, simple words and sentences.
8. Stick to one topic at a time.
9. Simplify and write down your instructions.
10. Use charts, models and pictures to illustrate your message.
11. Frequently summarize the most important points.
12. Give the patient a chance to ask questions.
13. Schedule older patient earlier in the day.
14. Greet them as they arrive or you arrive.
15. Seat them in a quiet and comfortable area.
16. Make signs, forms and brochures easy to read.
17. Be prepared to escort elderly.
18. Check on them frequently when they are waiting in a room.
19. Use touch to keep the patient relaxed and focused.
20. Say good bye while leaving.
21. Use common language not medical terms.
22. Confirm understanding with feedback.

2.8 SUMMARY

Communication is the process of transmitting ideas or thoughts from one person to another for the purpose of creating an understanding in the person receiving the communication .This emphasis on understanding focuses attention on the effectiveness of communication rather than simply on the mechanics of transmitting information.

The health care assistant must be aware of the therapeutic relationship and therapeutic communication techniques used with the clients because they are the tools of our plan of giving care to our clients.

Assertive behavior helps individuals to feel better about themselves by encouraging them to stand up for their own basic human rights and others. Assertive behavior increases self esteem and ability to develop satisfying inter personal relationship.

Through effective communication the health care assistant helps clients to accept the changes resulting from health alterations.

By understanding how to communicate with the people with special needs, health care assistants can give best care to our clients.

2.9 GLOSSARY

Communication	: The process of transmitting information such as thoughts, ideas, facts through use of language and symbols from one person to onther.
Communication process	**:** It is the series of elements and actions which are interconnected for any communication to take place.
Communication barriers	**:** These are elements that interfere with effective communication.
Perception	**:** Person's mental image or concept of elements in the environment including information gained through senses.
Therapeutic	**:** Pertaining to a treatment or beneficial acts.
Assertiveness	**:** Confidence in behaviour or style.
Technique	**:** A very often doing something by using special knowledge or skill.
Intonation	**:** Rise and fall in the pitch of the voice in speech
Barriers	**:** Something that prevents or blocks movements from one place to another
Anticipate	: To expect
Stressor	: Something that makes you worried

Insight	:	Ability to understand situations in a clear way
Deliberate	:	Discuss something very carefully in order to make decision
Foster	:	To promote the growth or development
Rapport	:	A friendly relationship
Empathy	:	A feeling that you understand and share another person's Experience and emotions
Clouding	:	To confuse
Fogging	:	A state of mental confusion
Concurring	:	To agree with someone or something
Criticism	:	A remark or comment that express disapproval of someone or something

2.10 SELF ASSESSMENT QUESTIONS

I. Fill in the blanks

1. Communication is a process _____
2. There are _____elements of communication process
3. _____is the person whom communication originates_____
4. Hearing impairment is a barrier of _____communication
5. Communication is an interpersonal interaction among the _____ _____ and the _____

II. What do you mean by

1. Assertiveness 2. Barrier 3. Encoding 4. Interaction
5. Theme identification

III. Multiple Choice

1. Verbal communication is
   a. By dance b. By word c. By letter d. By none
2. Communication
   a. Involves interaction
   b. Is a continuous process
   c. Is a multi dimensional two way process
   d. Includes all of the above
3. Example of environmental barrier of communication
   a. Noise b. Language c. Cultural practice d. None

4. Non verbal communication is by means of
   a. Word b. Gestures c. Lecture d. All of the above
5. To be a good communicator one may not possess the following
   a. Prejudice b. Communication skills
   c. Understand the message d. Understand the audience

IV. Answer the following

1. What are the purposes of communication?
2. What are the elements o f communication?
3. What are the types of communication ?
4. What are the barriers of communication ?

V. Short answers

1. Explain assertive behaviour
2. Briefly explain phases of a therapeutic nurse client relationship
3. Explain briefly about 6 therapeutic communication techniques with examples
4. What are the tips for effective communication?
5. List down the ways of communicating with people with special needs

Answer keys

Fill in the blanks:

1. Two way 2. 07 3. Sender or communicator 4. Physical 5. Therapeutic

Multiple choice:

1.B 2. D 3. A 4. B 5. A

2.11 SUGGESTED READING

1. **Park. K :** Essentials of Community Health Nursing ed-4, Jubalpur, 2004 Banarsides bhanot.
2. **Park. K :** Text book of Preventive and Social Medicine, ed-20, Jubalpur, 2009 Banarsides bhanot.
3. **Sundar Rao :** An introduction to Community Health Nursing, ed-4, Chennai, 2004 B.I Publishers.
4. **Sreevani R :** A Guide to Mental Health Psychiatric Nursing, ed-3, New Delhi, 2010 Jaypee brothers.

Dr.Mrs.Kasturi

5. **Gomez L.M :** Geriatric Nursing, ed-1, New Delhi, 2009 Jaypee medical publishes.
6. **Basavanthappa BT :** Nursing Education , ed-2 New Delhi, 2009 Jaypee medical publishes.
7. **Townsend M.C :** Psychiatric Mental Health Nursing, ed-5, New Delhi Jaypee brothers.

NURSING ASSISTANCE

3

Understanding Human Body (Part-A)

Structure

MODULE-1

Understanding Human Body (Part-A)

3.0 INTRODUCTION

Your body is more amazing than any machine on the earth. Your brain works like a complex computer, telling all the other systems in your body what to do. Your circulatory system includes your heart and blood. It delivers nutrients to your organs and keeps things clean. Your skin protects your body and keeps you from drying out. Bones give your body structure and strength. Muscles move your body. Your lungs take oxygen from the air for your body.

3.1 OBJECTIVES

After reading this unit, you should be able to

- Differentiate the various terminologies of Anatomy
- Describe the Structure and functions of the various systems of the human body

3.2 DEFINITION OF ANATOMY AND PHYSIOLOGY

Anatomy : It is the study of the structure of the human body

Physiology : It is the study of the functions of the human body

Anatomical position : When a person is standing upright with the head facing forward, arms by the side and the palms of the hands facing forward and feet together, it is said to be an anatomical position.

3.2.1 Terms Used in Anatomy

- Superior - higher
- Inferior -lower
- Anterior- nearer to the front of the body
- Posterior- nearer to the back of the body
- Medial- nearer to the midline
- Lateral- to the side of the body
- Proximal -nearer to the head or source
- Distal- distant from the head or source
- External -outside, or away from the trunk or centre of the body
- Internal- inside or nearer to the trunk or centre
- Superficial- nearer to the body surface
- Deep- inside or away from the body surface

3.2.2 Cavities of the body and their contents

Some parts of the body form spaces called cavities, in which important internal organs are protected.

- **The Cranial cavity** or skull contains the brain
- **The thoracic cavity** or chest contains

  The lungs,the air passages, trachea and bronchial tubes, the oesopha gus or food pipe which lies behind the trachea, the heart, the great blood vessels and the thoracic duct (the largest lymphatic vessel)
- **The abdominal cavity** is separated from the thoracic cavity by a dome shaped muscle called the diaphragm. It contains the stomach, the liver, the spleen, the pancreas, the small intestines,the large intestines or bowel, the kidneys and the ureters, the pancreas
- **The pelvic cavity** contains the reproductive organs, the bladder when empty(when full it rises into the abdominal cavity)and the rectum

3.2.3 Cells and Tissues

All living things, including the human body, are made up of living cells.

The cell is the structural and the functional unit of the human body. Just as many kinds of materials may be used in the construction of a large building, in the same way many different kinds of cells are found in the body.

A Cell has the following parts :

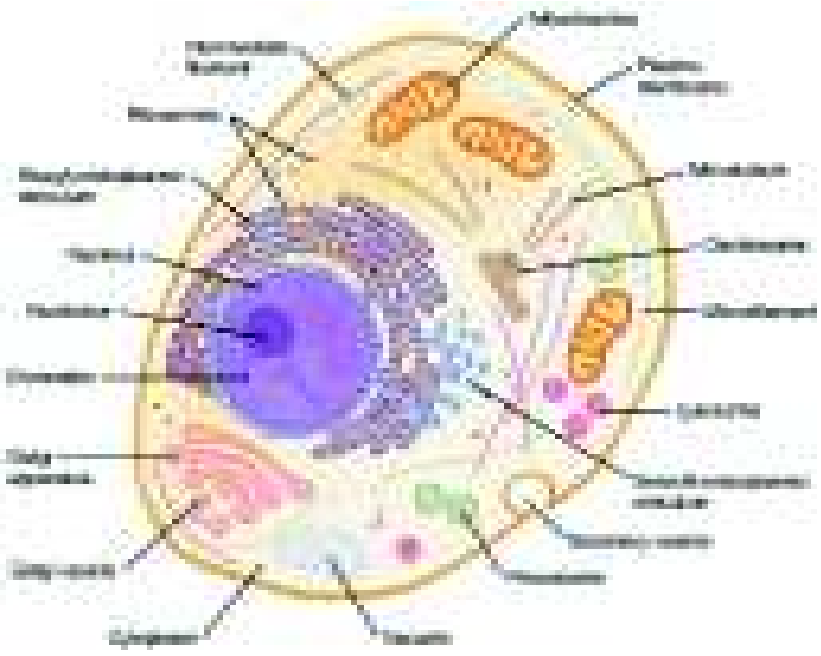

Fig 3.1: Structure of a cell

- Cell membrane, the outer covering
- Cytoplasm, the main substance of the cell
- Nucleus, which controls activities of the cell

Functions of Cells :

The main functions of cells include the following :

- **Digestion** : breakdown of large insoluble food molecules into small water-soluble food molecules so that they can be absorbed into the watery blood plasma.
- **Excretion** : elimination of wastes like urine and faeces
- **Respiration** : taking and using oxygen, and giving out carbon dioxide. **Growth and repair** : increasing the size of the cell and replacement of worn out cell.
- **Reproduction** : by each cell simply dividing into two.

Tissues

Tissues are materials made up of groups of similar cells. Cells are of various types, and tissues vary according to the types of cells in their structure. There are four main types of tissues in the human body.

They are Epithelial cells, Connective tissue, Fatty tissue and Cartilage

Epithelial tissue :This forms coverings like the skin, lining membranes and glands.

Connective tissue: This helps to support and bind parts together, holding them in place. There are several types of connective tissues including bone, cartilage, ligaments, fatty and elastic tissue and also blood and lymph (the fluid tissues).

Muscular tissue: This tissue has the power of contraction, which causes movement.

Nervous tissue : conducts nerve impulses.

Organs : Tissues join in larger units called organs, such as heart, lungs, brain, liver. Each organ is made up of different types of tissue, which enable it to do its special work.

A system : Is a group of organs, which together carry out one of the essential functions of the body. All of these systems work harmoniously together in a healthy body.

3.3 CARDIO VASCULAR SYSTEM

In this lesson, you will learn about the heart and its functions.

3.3.1 Basic Structure of the Heart

The heart is approximately the size of a person's fist and weighs less than a pound and is located in the middle and slightly to the left of the mediastinum in the chest. The heart is enclosed in three layers namely Pericardium, Epicardium and Myocardium.

Pericardium : Is a thick, fibrous and non-elastic outer layer. It consists of two layers, the inner visceral layer and the outer parietal layer. The two pericardial surfaces are separated by a pericardial space that contains about 10-20 ml of thin, clear pericardial fluid which acts as a lubricant and reduces friction produced by pumping action of the heart.

Epicardium: An epithelial single – celled layer surrounding the heart which is the inner most layer of the pericardium.

Myocardium: Is the actual heart muscle layer composed of striated muscle fibers. The myocardium is thicker in the ventricles than in the atria because it is responsible for the energy created to eject a volume of blood during pumping.

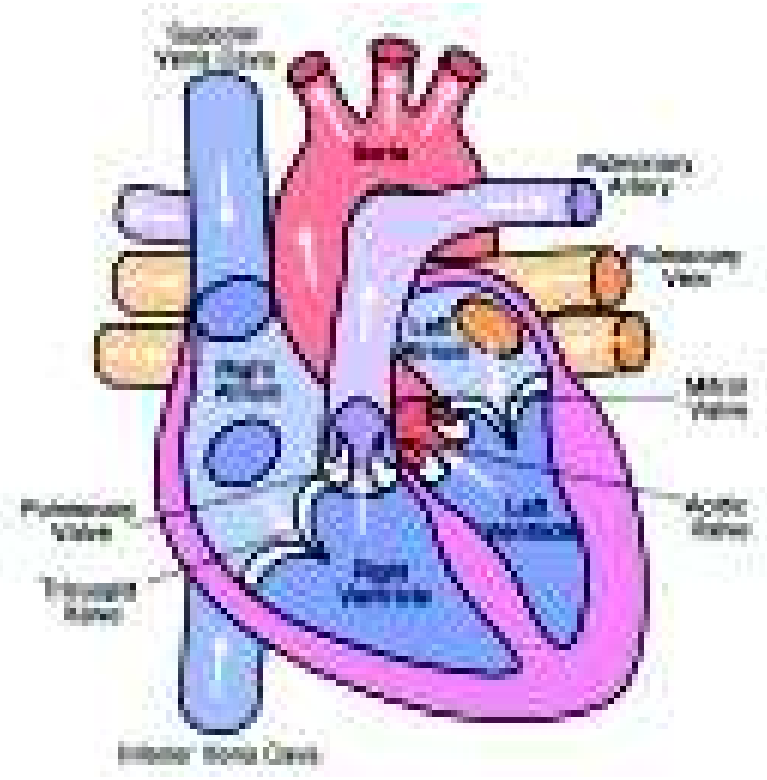

Fig. 3.2 Structure of Human Heart

3.3.2 Chambers of the Heart

The heart is divided into two halves by a muscular wall, a septum, as the right heart and the left heart. The function of the right heart is to collect all venous return and push it into the pulmonary vasculature. The function of the left heart is to receive blood into systemic circulation. The heart has four chambers. The upper chambers are called atrium – right and left. Their function is to collect the blood and push it into the lower chambers ventricles.(Fig 3.1)

3.3.3 Valves, Coronary Arteries and Veins

There are four valves which are flap – like structures that function to maintain unidirectional (forward) blood flow through the heart chambers. There are two atrio - ventricular valves which separate the atria from the ventricular and two semi lunar valves which separate the pulmonary artery and the aorta from their respective ventricles.

The coronary arteries are two in number. The right coronary artery arises from the aorta and branches into right marginal artery and posterior descending artery. The left coronary artery originates from the left aortic cusp and divides into left anterior descending and the circumflex arteries.

Veins over the cardiac anterior surface drain into the right atrium. The superior vena cava and the inferior vena cava drain blood from head and neck lower limbs into the right atrium.

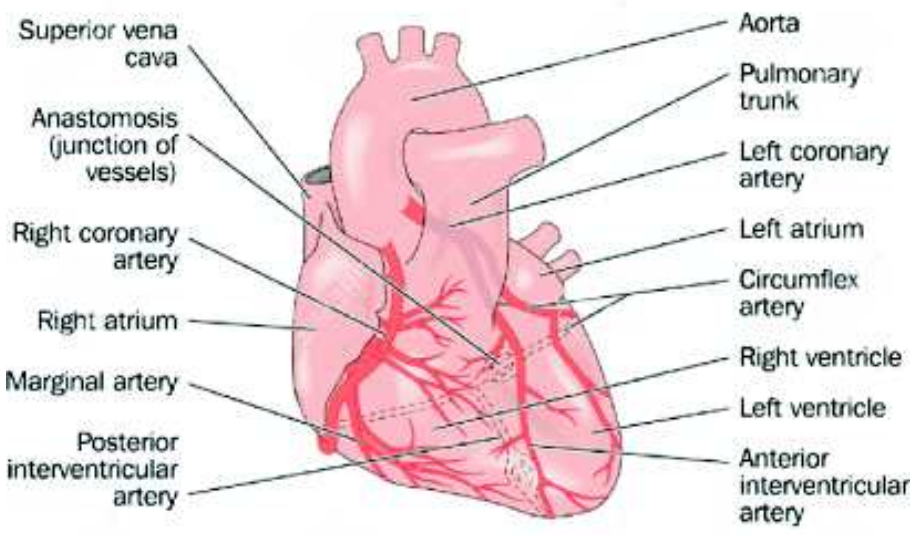

Fig. 3.3 Coronary Arteries

3.3.4 Blood Circulation

The right side works as the pulmonary pump. It receives oxygen poor blood from the veins of the body through the large superior and inferior vena cavae. Blood from the right atrium through the bicuspid valve enters the right ventricle. From there through the pulmonary arteries enters the lungs for purification, Oxygen rich blood drains from the lungs and is returned to the left side of the heart through the four pulmonary veins. This circulation is called pulmonary circulation.

Blood from left side of the heart is pumped out of the heart into the aorta from which the systemic arteries branch to supply essentially to all body tissues. Again oxygen poor blood is collected from all body tissues and drained into the right atrium. This circulation is called as systemic circulation.

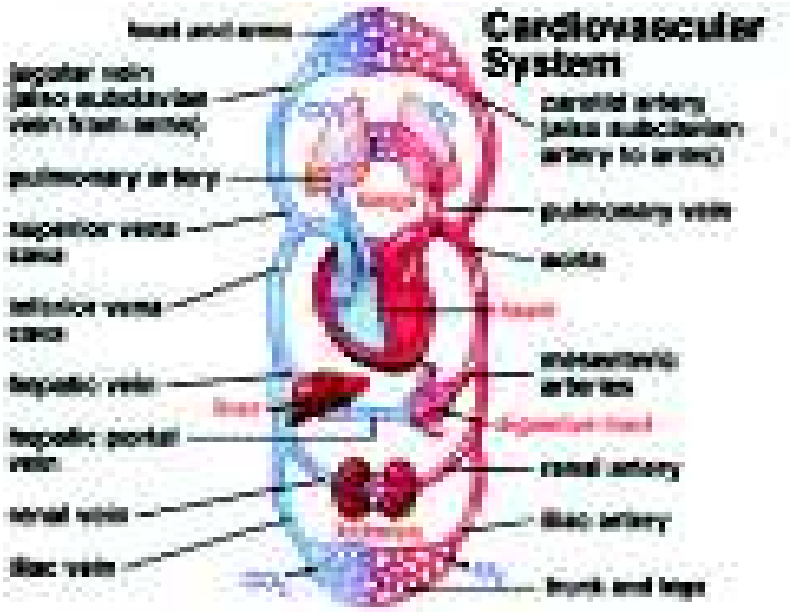

Fig. 3.4 Blood Circulation

3.3.5 Conduction System of the Heart

This is also known as the electrical system of the heart. Sinoatrial (SA) node is the pace maker mode located in the right atrium near the opening of superior vena cava. It is called the 'pacemaker' of the heart. The conduction travels thus at the SA node and the Electrical impulses are originated, travels to AV node through the internodule tracts. Bundle of His fibres through the septum and Purkinje fibres transmits impulses to both ventricular walls.

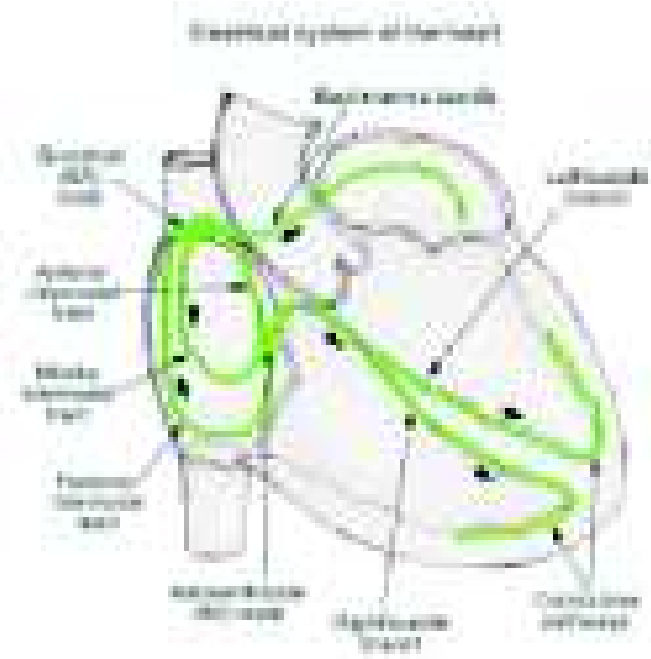

Fig. 3.5 Electrical System of the Heart

3.3.6 Functions of the Vascular System

The major functions of the circulatory system is to provide a transport mechanism for the blood flow to and from the heart. The vascular system provides oxygen and nutrients through the arterial system and capillary beds and removes metabolic waste products via the nervous systems.

3.3.7 Types of Blood Vessels

Arteries : Carry blood away from the heart via the pulmonary artery and aorta.

Arterioles : As major arteries begin to branch, they become smaller and smaller and capable of distension and constriction.

Capillaries : These are very small vessels providing almost 60,000 miles of vascular tubules. They help in passage of nutrients, plasma, oxygen and waste products across their membranes.

Veins : Blood from capillaries travels through small veins called venules which become larger as they approach the heart, terminating in the two largest veins – the superior and the inferior vena cavae. Veins contain valves that promote blood flow to the heart against the forces of the body

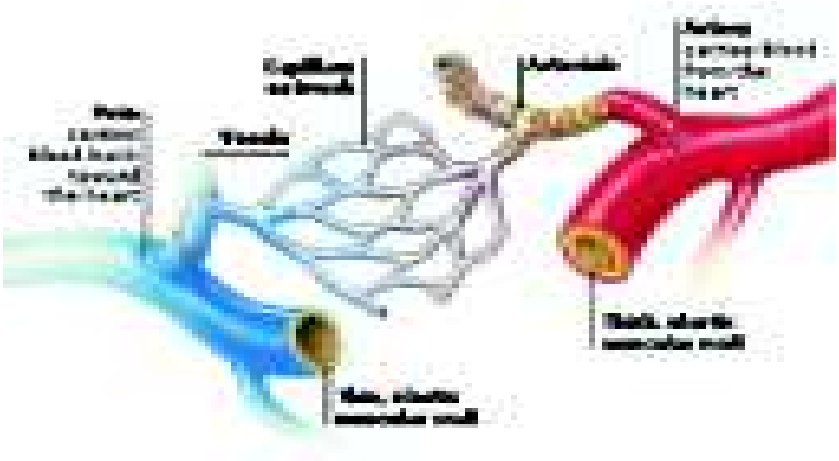

Fig. 3.6 Types of Blood Vessels

3.4 RESPIRATORY SYSTEM

Respiration is the process of gaseous exchange between an organism and its environment. In man and the higher animals, the gaseous exchange between the tissues and environment is termed as **Internal or tissue respiration**. The exchange of gases between the body and the environment taking place in the lungs is termed as **external respiration**. The external respiration constitutes processes of inspiration and expiration. Inspiration is an active muscular contraction while expiration is merely a passive act of the relaxation of respiratory muscles.

3.4.1 Structure of Respiratory System

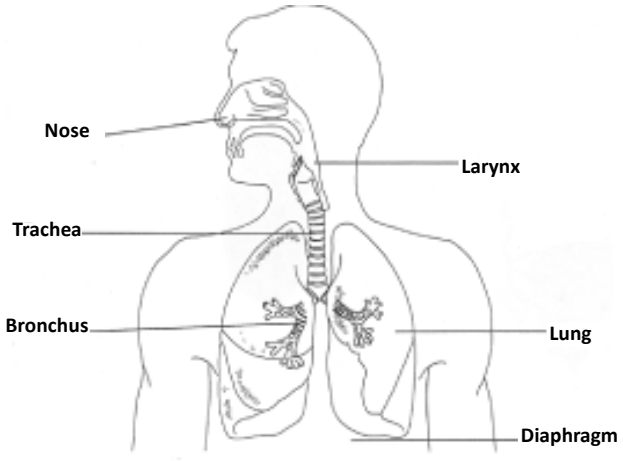

Fig. 3.7 Respiratory System

The respiratory system is responsible for taking in oxygen and giving off carbon-dioxide and water. It is divided into the upper respiratory tract and lower respiratory tract.

- **The upper respiratory tract:** Consist of nose, mouth, the throat, pharynx, larynx and numerous sinus cavities in the head
- **The lower respiratory tract** : Consist of trachea, bronchi and lungs, which contain bronchial tubes bronchioles and alveoli or air sacs.
- **Lungs :** The two lungs, which are the principal organs of the respiratory system, are situated in the upper part of the thoracic cage. They are inert organs, i.e. they do not work by themselves, but function with the help of a muscular wall known as the diaphragm.
- **Pharynx:** It is a tube approximately 12cm in length, which is a common opening for both digestive and respiratory system. It connects the oral cavity to oesophagus (food tube) and nasal cavity to larynx and wind pipe. The opening into larynx is oval in shape and guarded by leaf like epiglottis.
- **Epiglottis**: folds down over the opening like a trap door while food or liquid is being swallowed. It prevents the entry of foreign substances into the respiratory passage ways. The closure of epiglottis, when we swallow, is a reflex action and can be interfered with, if one attempts to talk and swallow at the same time. If this happens one may choke to death in the absence of immediate assistance. From pharynx, air passes through trachea, which is 12cm long and 1.5cm in diameter. The tract consists of a large number of C shaped cartilage rings.
- **Larynx or the Voice Box** : It is at the top of trachea. It is the vocal cords inside the box, which by its coming together and going away from one another produces different sounds.
- **Trachea :** Branches at its lower end into the right and left bronchi which enters the lungs. Within the lungs those passage ways repeatedly divide, forming microscopic tubes called bronchioles. Each bronchiole ends with several clusters of microscopic elastic air sacs called alveoli, which are the functional units of lungs. This resembles bunch of grapes. The paired lungs lie within the large cavity of the chest, the thoracic cavity. lungs are grayish in colour and are spongy in appearance. The right lungs has three lobes upper, middle and lower, and the left lung has two lobes upper

and lower. The floor of the thoracic cavity is formed by a dome like muscular structure called diaphragm. Each lung is enclosed by two layers of membrane called pleural membranes The chest cavity is also lined with this membrane. This layer is known as the parietal pleura, while visceral pleura line the lung parenchyma.

3.4.2 Physiology of Respiration

We breathe continuously from birth to death, day and night in health and disease. Respiration may be defined as the mechanical process of breathing in and out, a function which involves both the respiratory system and muscles of the respiration. Two phases of breathing are

- Inhalation during which air is drawn into lungs
- Exhalation which refers to the expulsion of air from the alveoli

Inhalation : The diaphragm when relaxed is a flattened dome shaped structure pointing upwards to the lungs. During the process of inhalation it contracts. It flattens, pulls down the thorax, increases the volume of the thorax, and thus decreases the atmospheric pressure in the lungs. This causes air to rush in during the respiration.

Exhalation : During the process of exhalation, the diaphragm relaxes. The thorax is pushed up, the volume decreases, the atmospheric pressure increases and air rushes out of the lungs. The inspired air, which contains oxygen, passes down into the billions of minute air chambers or air cells known as alveoli, which have very thin walls. Around these walls are the capillaries of the pulmonary system. It is at this point that the fresh air gives off its oxygen to the blood and takes carbon di oxide from the blood by diffusion, which is then expelled with the expired air.

The respiratory centre of the brain is located in the medulla, immediately above the spinal cord. From this centre, nerve fibers extend down into the spinal cord. From the neck part of the cord, these nerve fibers continue through the phrenic nerve to the diaphragm. The diaphragm does not continue to work if it is cut off from its nerve supply. If one nerve is cut, the diaphragm of that side is paralyzed. This centre is governed by variation in the chemistry of the blood. If there is an increase in Co_2 in the blood, the cells of the respiratory center are stimulated and they in turn send impulses down the phrenic nerve to the diaphragm.

Respiratory Rate: In adults, the respiratory rate is 14 to 18 times per minute. Children breathe more superficially and therefore have a higher respiratory rate.

3.4.3 Importance of respiration

- It supplies oxygen and eliminates carbon di oxide.
- It excretes volatile substances like ammonia, ketone bodies, essential oils, alcohol and water vapour, etc.,
- By adjusting the amount of carbon di oxide elimination, it helps to maintain the acid base balance.
- It helps to maintain the normal body temperature.
- It is necessary for the maintenance of optimal oxidation reduction process

3.5 DIGESTIVE SYSTEM

The digestive tract is a long, hollow tube that passes through body, providing an isolated environment for digestion and absorption of nutrients. Alimentary canal is a continuous tube that extends from mouth to anus.

3.5.1 Organs of the digestive tract are mouth, most of the pharynx, Oesophagus, Stomach, Small intestines and Large intestines

Accessory digestive organs are Teeth, Tongue, Salivary glands, Liver, Gall bladder and Pancreas

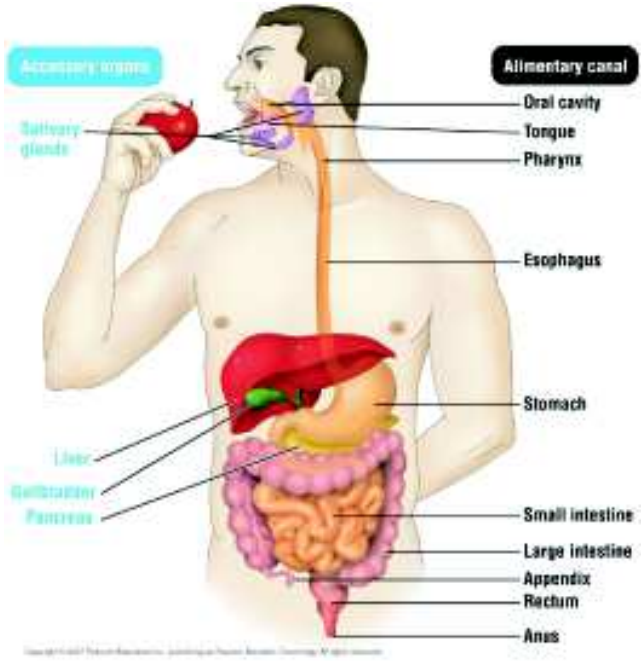

Fig. 3.8 Digestive system

There are four layers of tissues in the digestive tract. They are Mucosa, Sub mucosa, Muscularis and Serosa.

Mucosa : It is a mucous membrane which is composed of epithelium, lamina propria and muscularis mucosa.

Sub mucosa : It binds the mucosa to muscularis.

Muscularis : It contains skeletal muscles that helps in swallowing.

Serosa (visceral peritoneum) : It is composed of areolar connective tissue and simple squamous epithelium.

Peritoneum: It is the largest serous membrane of the body.

Types of Peritoneum are :

- **Parietal:** It lines the walls of abdominopelvic cavity.
- **Visceral**: It covers some of the organs in the cavity.

The space between parietal and visceral portions of the peritoneum is called the peritoneal cavity. One extension of the peritoneum is called mesentery. Mesocolon is a fold of peritoneum. Mesentery and mesocolon hold the intestines loosely in place.

3.5.2 Mouth

It is referred to as the oral or buccal cavity. It is formed by the cheeks, hard and soft palate and tongue.

• Lips: It surrounds the opening of mouth

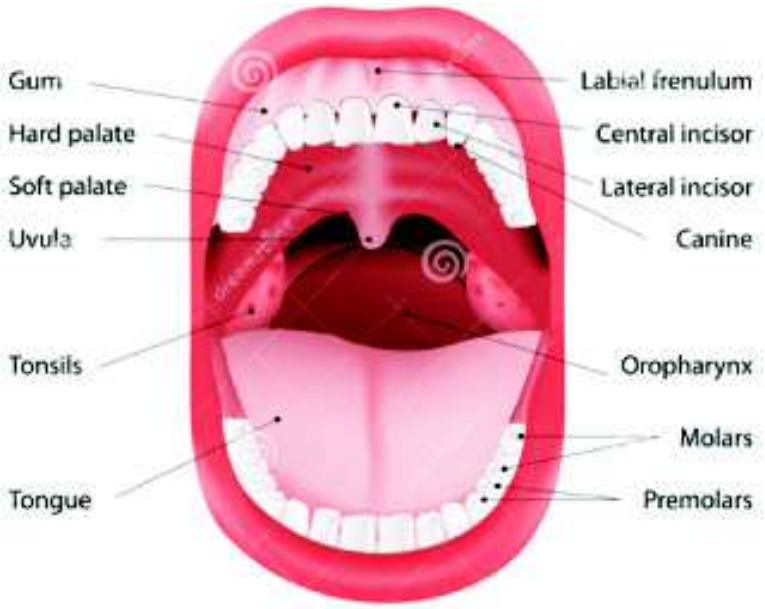

Fig. 3.9 Structure of the Mouth

- **Hard palate** : Hard palate is the anterior portion of the roof of the mouth, which is formed by maxillae and palatine bones. Soft palate forms the posterior portion of the roof of the mouth. It is lined by mucous membrane.
- **Uvula**: It hangs from the free border of the soft palate.
- **Tongue**: The tongue, together with its associated muscles forms the floor of the oral cavity. It is composed of skeletal muscles.
- **Teeth** : It is located in the sockets of the alveolar process of mandible and maxillae. Alveolar process are covered by gingiva.
- **Pharynx** : Swallowed food passes from mouth to pharynx, a funnel shaped tube that extends from the internal nares to the esophagus posteriorly and to larynx anteriorly. It is composed of skeletal muscles. Pharynx is having three parts. They are Nasopharynx, Oropharynx and Laryngyopharynx

Oesophagus

It is a collapsible muscular tube, about 25cm long that lies posterior to trachea. It secretes mucous and transports food in to the stomach. The movement of food from mouth into stomach is by deglutition.

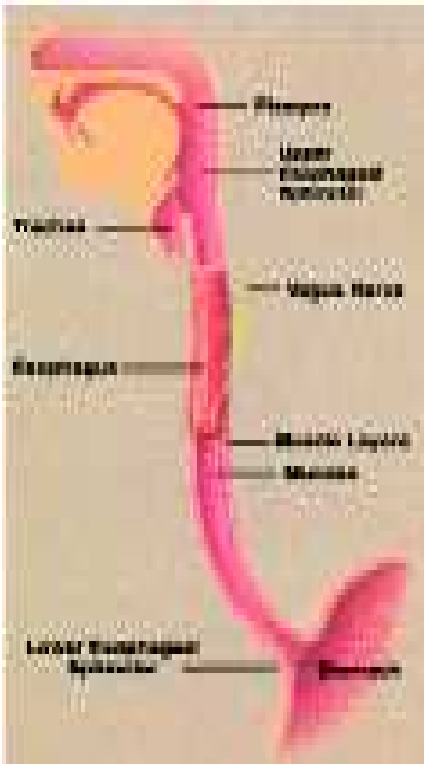

Fig. 3.10 Oesophagus

3.5.3 Stomach

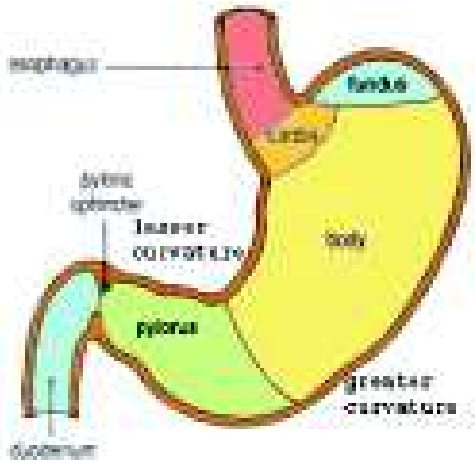

Fig. 3.11 The Stomach

The parts of stomach are Cardia, Fundus, Body and Pylorus.

Pyloric sphincter and cardiac sphincter, greater and lesser curvature are also the parts. The secretions of mucus, parietal and chief cells form gastric juice.

3.5.4 Pancreas

It is a retroperitoneal gland, which lies posterior to the greater curvature of stomach. The parts are head, body and tail

Functions of Pancreatic Juice are

- Buffers acidic gastric juice in chyme.
- Creates proper P^H for the action of enzymes in the small intestine.

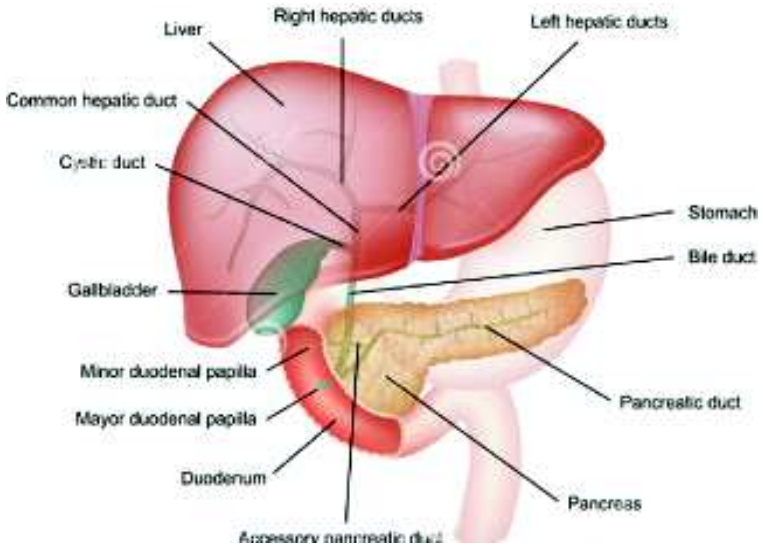

Fig. 3.12 Liver and Gallbladder

3.5.5 Liver and Gall bladder

Liver is the heaviest gland in the body that weighs 1.4kg. Liver is interior to diaphragm and occupies most of the right hypochondriac and part of the epigastric regions of the abdominopelvic cavity. It is covered by visceral peritoneum.

Gall bladder is located in a depression of the posterior surface of liver. The parts are fundus, body and neck. Bile is secreted by hepatocytes . Volume is 800-1000 ml / day.

Functions of liver are

- carbohydrate metabolism
- lipid metabolism
- protein metabolism
- processing of drugs and hormones
- excretion of bilirubin
- synthesis of bile salts
- storage
- phagocytosis
- Activation of vitamin D

3.5.6 Small Intestine

The major events of digestion and absorption occur here. Length is three meters. The parts of the small Intestine are Duodenum, Jejunum and Ileum. The wall is made up of mucosa, sub mucosa, muscularis and serosa.

The Functions of the Small Intestine are

- Segmentation: mix chyme with digestive juices and bring food into contact with the mucosa for absorption. Peristalsis propels chyme through small intestine.
- Completion : Completes the digestion of carbohydrates, proteins and lipids.
- Absorption : Absorbs about 90 % of nutrients and water that passes through the digestive system. Mechanical and chemical digestion occurs.

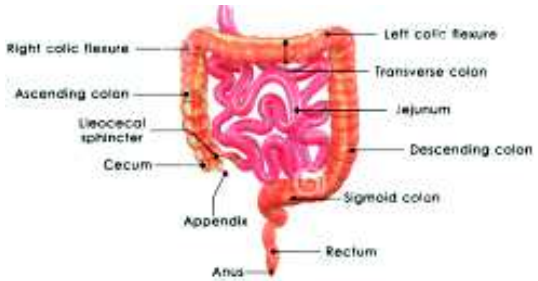

Fig. 3.13 Small and Large Intestines

3.5.7 Large Intestine : It is the terminal portion of Gastro intestinal tract (GIT). It is 1.5 meters long and 6.5 cms in diameter. It extends from ileum to anus.

The Regions of large intestine are cecum, colon, rectum and anal canal. Ileocecal sphincter is at the opening from ileum into large intestine. Attached to cecum vermiform appendix is the open end of cecum merging with a long tube called colon. Parts of colon are Ascending colon, Transverse colon, Descending colon and Sigmoid colon .

Rectum

Last 20 cms of the GIT, lies anterior to sacrum and coccyx. Terminal 2-3 cm of rectum is called anal canal. The opening of anal canal to the exterior is anus which has an internal and external sphincters. Layers are mucosa, sub mucosa, muscularis and serosa.

The Functions of Rectum are

- Haustral churning, peristalsis and mass peristalsis drive the contents of the colon in to rectum.
- Bacteria in large intestine converts proteins in to amino acids.
- Absorbing some water, iron and vitamins. Now it is called faeces.

3.6 URINARY SYSTEM

The urinary system is the one of the excretory systems of the body. The major function of the urinary system is to help to maintain homeostasis. It consists of following structures:

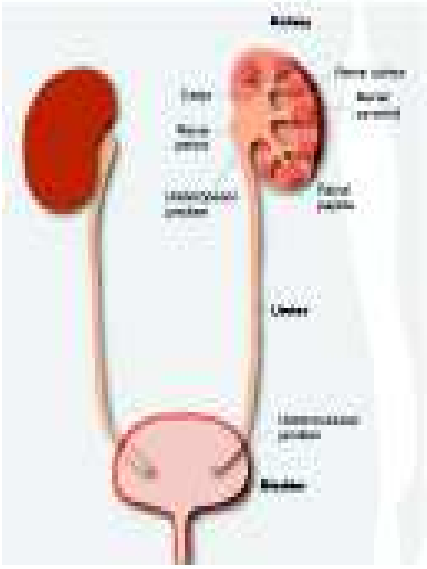

Fig. 3.14 Structure of Kidney

- **Two kidneys** , which secrete urine
- **Two ureters**, which convey urine from kidneys to urinary bladder.
- **One urinary bladder**, where urine collects and temporarily is stored.
- **One urethra**, through which the urine is discharged from urinary bladder to exterior.

3.6.1 Kidney

Kidneys are bean-shaped reddish organ that are retroperitoneal on either side of the vertebral column at about the level of the twelfth thoracic vertebra (T12) to third lumbar vertebra (L3).

- Each kidney weighs 120gm to 170gm, 10cm to 12cm long, 5cm to 7cm wide and 3cm thick.
- Three layers of tissues surround each kidney

1. Renal capsule- deeper layer
2. Adipose capsule- intermediate layer
3. Renal fascia-superficial layer

- Kidneys are concave and the medial border facesing the vertebral column
- Renal hilus, present at centre of the concave border is a deep vertical fissure through which ureters leave the kidney. Blood and lymphatic vessels, and nerves also enter and exit kidney through the renal hilus.

kidney has two distinct regions. They are

- Renal cortex- a superficial reddish area
- renal medulla- a deeper reddish-brown region. Within the renal medulla, there are 8-18 cone shaped are present.
- Base of each pyramid faces renal cortex and its apex is called renal papilla
- Urine forms and drains into large ducts called papillary ducts and enter into minor and major calyces
- Each kidney has 8-18 minor calyces and 2-3 major calyces. The minor calyces widen and merge to form major calyces, which form a funnel-shaped sac called renal pelvis and then out through the ureter to urinary bladder.

Microscopic Structure of the Kidney

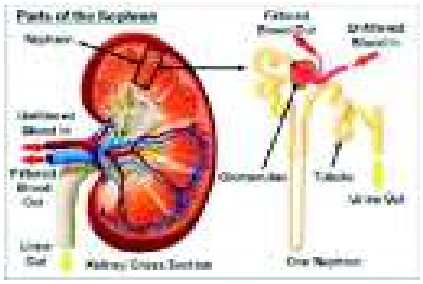

Fig. 3.15 Nephron

Nephron

- It is a functional unit of kidney
- Each kidney has more than 1 million nephrons
- A nephron is composed of a glomerulus, Bowman's capsule and tubular system
- The tubular system consists of the proximal convoluted tubule, the loop of Henle, the distal convoluted tubule leading into a collecting duct

3.6.2 Ureters

The ureters are tubes approximately 10-12 inches long and 0.08 – 0.3 inches in diameter that carry urine from the renal pelvis to the bladder.

- ureteropelvic junction, where the ureters joins the renal pelvis

The ureters consists of 3 layers,

- An outer covering of fibrous tissue
- A middle muscular layer consisting of interlacing smooth muscles
- An inner layer, the mucosa, lined with transitional epithelium.

3.6.3 Urethra

- The urethra is a small tube leading from the internal urethral orifice in the urinary bladder to the exterior of the body.
- In females, the urethra lies directly posterior to the pubic symphysis and length is approximately 4cm.
- In males, the urethra also extends from internal urethral orifice in the urinary bladder to the exterior of the body which is is 15-20 cm long.
- The opening of the urethra to the exterior is through external urethral orifice.

3.6.4 Urinary Bladder

The urinary bladder is a hollow muscular organ situated in the pelvic cavity posterior to the pubic symphysis. In the male, it is directly anterior to the rectum. In the female, it is anterior to the vagina inferior to the uterus. It is easily movable organ held in position by folds of the peritoneum. The shape of the bladder depends on how much urine it contains.

In the floor of the bladder is a small triangular area called the trigone. The two posterior corners of the trigone contain two ureteral openings whereas the opening into urethra, (the internal urethral orifice) is in the anterior corner.

Three coats make up the wall of the urinary bladder. They are

- Mucosa the deepest layer composed of transitional epithelium
- Intermediate muscularis, called the detrusor muscle.
- Adventitia, the most superficial layer containing areolar connective tissue. It serves as the passage for the discharging urine from the body. The male urethra also serves as the duct through which various reproductive secretions are discharged from the body.

3.7 SUMMARY

In this lesson we have discussed on the various systems of the human body. Some important facts for you to remember are:

- The body is made like a complex perfect machine.
- Each part is specially constructed to carry out its own function.
- The human body is made up of living cells.
- Each cell has cell membrane, cytoplasm and nucleus.
- The functions of the cells are digestion, excretion, respiration, growth, repair and reproduction.
- Tissues are made up of groups of similar cells.
- Tissues are joined into larger units called organs.
- A system is a group of organs.
- The main function of circulatory system is transportation of oxygen, nutrients to tissues and carriage of metabolic waste products to the excretory organs.
- The lymph glands help to protect the body from infection.

- The functions of digestive system are digestion, absorption of nutrients and excretion of undigested food.
- Respiration is the process of gaseous exchange between an organism and its environment.
- The lungs, kidney and skin are the important excretory organs in our body.

3.8 SELF ASSESSMENT QUESTIONS

I Fill in the blanks :

1. Study of the structure of the human body is called as ————————
2. Excretion means ————————————————————
3. ———————————— conducts nerve impulses.
4. Innermost layer of the heart is _____
5. The two great blood vessels which carry blood away from the heart are _____ and the _____
6. The SA node is called as the _____ of the heart
7. The act of digestion begins in ————————
8. The enzyme present in saliva is ————————
9. The acid present in the stomach is ————————
10. ———————— is the finger like structures present in small intestine which helps in digestion
11. ———— is the length of small intestine
12. ———————— is the last part of digestive system
13. ———————— is the functional unit of kidney
14. Normal amount of urine produced in adults per day is ————————
15. Temporary storage of urine takes place in ————————
16. ———————— is the gland present above the kidney
17. Weight of the each kidney is ————————
18. ———————— is the outlet for urine

II List the different types of the blood vessels.

III Draw the structure of the conduction system of heart.

3.9 GLOSSARY

Lubricant, Pulmonary, Pacemaker, Homeostases

3.10 SUGGESTED READING

1. Mareib N.E. : Essentials of Human Anatomy & Physiology, ed 8 Delhi 2006
2. Respiratory & Cardiovascular Nursing. BNS-106, Medical Surgical Nursing. New Delhi IGNOU .

NURSING ASSISTANCE

4

Understanding Human Body (Part-B)

Structure

MODULE-1

Understanding Human Body (Part-B)

4.0 INTRODUCTION

In unit III (Part A) on understanding of Human Body, you have learnt about the structure of cardiovascular , respiratory, digestive and urinary system. Further in this unit let us study regarding the structure and functions of Nervous, musculoskeletal, endocrine systems, skin, eye, ear, nose, throat and reproductive system.

4.1 OBJECTIVES

After reading this unit, the student should be able to

- describe the structure and function of nervous, musculo skeletal, endocrine systems eye, ear, nose, throat and reproductive system.

Now let us start with the structure of nervous system.

4.2 NERVOUS SYSTEM

You will find that the nervous system functions like a telephone system. With the brain as the head office, and nerves like the telephone wires communication takes place with all parts of the body. By means of numerous messages sent and received, the various tissues and organs of the body work in harmony.

The nervous system has two parts. They are

1) **Central Nervous System :** It is made up of the brain and cranial nerves, spinal cord, and spinal nerves. It controls the voluntary muscles of the head, trunk and limbs. It receives messages from sense organs such as skin, eyes and ears.

2) **The Autonomic Nervous System** : This is made up of sympathetic and parasympathetic nerves. It controls involuntary (internal) muscles and glandular secretions. Nerve tissue, of which these nervous systems are composed of is soft tissue made up of nerve cells and nerve fibres. The cells massed together, as in the brain, form what is called the gray matter. The nerve fibres form 'white matter'. Nerve fibres are each connected with their own nerve cells, forming a unit called a neurone. Messages jump across from one neurone through its fibres to another neurone. The fibres of some neurones are very long (eg. those in the limbs) and they are grouped together as visible white nerve trunks.

There are three types Nerves. They are

- Sensory nerves, which carry messages from all parts of the body to the brain and spinal cord. They enable the body to react for its protection.
- Motor nerves, which take messages from the brain and spinal cord to muscles and glands in all parts of the body. They stimulate activity.
- Mixed nerves consist of both sensory and motor nerve fibres. So they carry messages in both directions.

Now let us proceed to the structure of brain.

4.2.1 The Brain

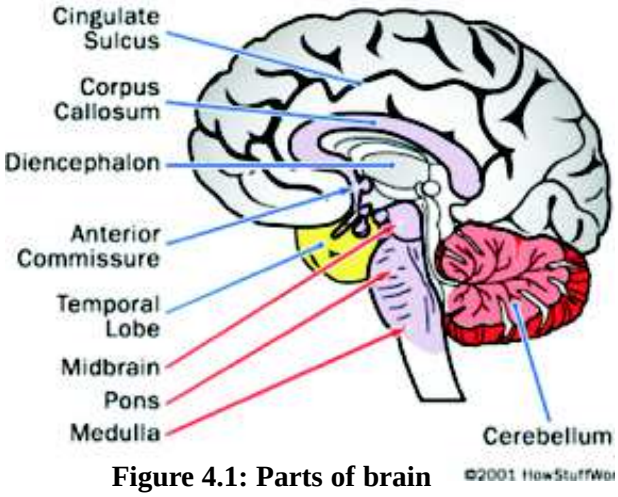

Figure 4.1: Parts of brain

As you see in the figure no 4.1, the brain is the most important part of central nervous system.

It is well protected in the cranial cavity and has the following parts.

1. The cerebrum or forebrain
2. The cerebellum or hind brain
3. The mid brain
4. The brain stem, consisting of pons and medulla

4.2.2 The cerebrum

The largest part of the brain fills the front and top parts of the skull. It has two parts, right and left. These two parts control the opposite sides of the body, so that disease or injury of the right side of the cerebrum paralyses the left side of the body, and vice versa.

Functions of Cerebrum are

1. **Frontal lobe** : a) Motor centres controlling voluntary muscles b) Speech centre c) Mental powers such as memory, intelligence and will.

2. **Parietal lobe** : The sensory centres for sensations of touch, pain, heat, cold and pressure
3. **Temporal lobe**: For hearing
4. **Occipital lobe** : For vision (sight)

4.2.3 The Cerebellum

The cerebellum is situated underneath the cerebrum at the back. It is smaller than the cerebrum. It also has a right and left side. Its activities are unconscious and not under control of the will of the person. Functions of the Cerebellum are

1. Helps to maintain balance
2. Helps to maintain muscle tone
3. Coordinates the work of muscles

4.2.4 The Mid Brain

This consists of two short stalks of nerve tissue attached to the lower part of the right and left sides of the cerebrum in the centre.

Functions of the Mid Brain are

1. Acts as a pathway for messages to and from the cerebrum.
2. Contains reflex centres for vision and hearing.
3. Contains centres for controlling body temperature(hypothalamus), the emotions and sexual responses.

4.2.5 The Brain Stem

The brain stem is like a stalk connecting the brain, with the spinal cord and has the following parts.

1. **The Pons**: This part, situated below the mid brain, is like a bridge connecting the two sides of the cerebellum and the midbrain with the medulla below.
2. **The medulla :** This joins the pons above to the spinal cord below. It looks like the spinal cord but is a little thicker. It lies just inside the skull.

Functions of the medulla

1. Connects the brain with the spinal cord, and conveys messages. It is in the medulla that cerebral nerve fibres cross over to the opposite side.

2) Contains nerves centres, which control the vital functions of circulation and respiration.
3) Contains reflex centres of swallowing, vomiting and coughing.

4.2.6 Cranial Nerves

There are twelve pairs of cranial nerves which come out from the brain and brainstem. They pass through holes in the skull to the eyes, ears, face, tongue, throat, etc. The tenth cranial nerve- vagus, gives branches to the larynx, lungs, heart and digestive organs. The vagus nerve functions as part of the autonomic nervous system.

4.2.7 The Spinal cord

We have discussed till now regarding the structure and functions of different parts of the body. Next let us learn the structure of spinal cord. As you observe in figure 4.2, the spinalcord is a cord of nervous tissue, the thickness of a little finger and about 12cm long. It lies inside a canal formed by the vertebrae. It connects above with the medulla where the back of the neck joins the skull and extends to the level of the first lumbar vertebrae.

Figure 4.2 Parts of spinalcord

Functions of the spinal cord:

1. Receives motor impulses from the frontal lobe of the cerebrum, and passes them on to muscles via the spinal nerves.
2. Receives sensations from the skin and other tissues and relays the message to the brain.
3. Reflex action. This is the quick response in the spinal cord itself. eg. If you touch something hot, the message received in the spinal cord is immediately flashed to the muscles of the arm before the news reaches the brain, you have taken your hand away from the hot object.

4.2.8 The Meninges and Cerebro Spinal Fluid (C.S.F.)

The brain and spinal cord are covered by three membranes called meninges.

1. Duramater is the outer, thick elastic cover. It lines the skull and spinal cord.
2. Arachnoid, a thin middle membrane. It is a loose covering and under is a space called 'theca' (sub arachnoid space) containing cerebro spinal fluid (C.S.F.)
3. Piamater is closest to the nerve tissue and carries blood vessels. When these membranes get infected, the condition is known as meningitis.

Cerebro Spinal Fluid (C.S.F.)

This is a clear fluid, which circulates both inside and outside the brain and spinal cord. A little cerebrospinal fluid is sometimes removed by 'lumbar puncture' to help in diagnosing disease of the nervous system.

Functions of Cerebrospinal Fluid

It acts as a water cushion to protect the brain and spinal cord from shocks and jarring. It nourishes and cleanses, washing away water and toxins.

4.2.9 The Autonomic nervous systems (ANS)

It is the second system of the nerves that controls the movements of the involuntary muscles and the secretion of the glands. We have no control over these nerves although they are closely connected with the central nervous system. In the ANS, there are two sets of nerves, which oppose each other in action.

Sympathetic Systems

This consists of two chains of ganglia (groups of nerve cells) one on each side of the vertebralcolumn. The ganglia are attached by fibres to the

spinal nerves. The sympathetic nerves are stimulated by the emotions such as fear, excitement and anger.

The results of the sympathetic nerve stimuli are:

- Dilated pupils
- The heart beats quicker
- Breathing is quicker and deeper
- The blood pressure is raised
- Digestion is slowed down
- Sweating is increased and
- Anal and urethral sphincters tighten up.

Parasympathetic System:

This system is in control during normal quiet living. Certain cranial nerves (the vagus especially) have such actions as the following.

- Pupils of the eyes contract
- Increase in saliva flows
- Digestion and peristalsis are stimulated

I think the information provided is sufficient for you to understand our spinal cord. Now let us do simple exercise to know how much you have understood. Kindly answer all the questions. If any clarifications, go through the suggested reading given in this chapter.

4.3 ENDOCRINE SYSTEM

Can we imagine our body functioning without the support of each system or organs. The main supportive system of normal physiological functioning is the endocrine system. The organs of the endocrine system referred to as glands. The endocrine glands produce chemical substances called hormones and secrete them in to blood. There are two types of glands.

a. Endocrine glands b. Exocrine glands.

Exocrine glands secrete their substances into ducts that then empty into a body cavity or on to surface. Eg. Salivary gland produces saliva.

Endocrine glands do not have ducts. They secrete their substances directly into the blood.

Hormones : Hormone is a chemical substance synthesized and secreted by specific organ or tissue. Hormones are classified by their chemical structure as lipid soluble hormones and water soluble hormones.

Lipid soluble hormone includes steroid hormones and thyroid hormones. All other hormones are water soluble.

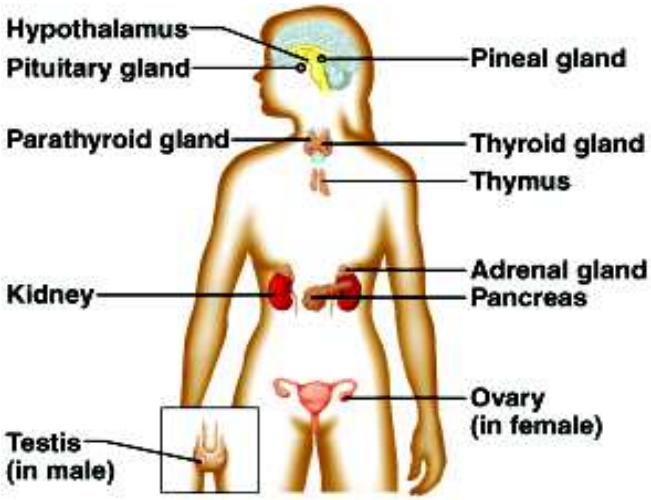

Figure 4.3 Endocrine System

Now let us have an overview regarding the different organs of endocrine system.

4.3.1 Hypothalmus

As you see in figure 4.3 , hypothalamus is situated in the brain. The important group of hormones from the hypothalamus are releasing hormone and inhibiting hormone. Hypothalamus contains neurons which receive input from the brain stem and limbic system.

4.3.2 Pituitary Gland

The pituitary gland is pea shaped structure that measures 1-1.5cm. It is located under the hypothalamus, at the base of the brain above the sphenoid bone. You know, it is called as the master gland in our body. The pituitary gland consists of two parts. They are Anterior pituitary and posterior pituitary

Anterior Pituitary : Several hormones secreted by the anterior pituitary are referred to as topic hormones, hormones that control the section of hormones by other glands. Thyroid stimulating hormone (TSI) stimulates the adrenal cortex to secrete thyroid hormones. Follicle – stimulating hormone (FSH) stimulate secretion of oestrogen and development of ovum in the female, and sperm development in the male.

Luteininzing hormone (LH) stimulates ovulation in the female & secretion of sex hormones in both the male & female. Growth hormone affects all body tissues. It affects the growth and development of skeletal

muscles and long bones. It affects person's size and height. Prolactin is a hormone that stimulates breast development necessary for lactation after child birth. It is a lactogenic hormone.

Posterior Pituitary : Posterior pituitary is composed of nerves tissue and extension of the hypothalamus. The communication between the hypothamus and posterior pituitary occurs through nerve tracts known as the median eminence. The hormones secreted by the posterior pituitary, are anti diuretic hormone (ADH) and oxytocin. It is produced in the hypothalamus.These hormones travel down the nerve tracts from the hypothalamus to the posterior pituitary and stored until their release is triggered by the appropriate stimuli.

Anti diuretic hormone : ADH helps in regulation of fluid volume by stimulating reabsorbtion of water in the renal tubules. ADH is also called vasopressin, and ADH is a potent vasoconstrictor.

Oxytocin : Oxytocin stimulates ejection of milk into the mammary ducts and contraction of uterine smooth muscle. Oxytocin secretion is increased by stimulation of touch receptors in the nipples of the lactating women and vaginal pressure receptors. This hormone travels down the nerve tracts from the hypothalamus to the posterior pituitary and is stored until its release is triggered by the appropriate stimuli.

4.3.5 Thyroid Gland

The largest of the endocrine glands is the thyroid which is located in the neck region. The thyroid gland weighs 25gms in a healthy adult. It has two oval parts called the lateral lobes on either side of the trachea. These two lobes are connected by a narrow band called isthmus. The entire gland is enclosed by a connective tissue capsule. This gland produces hormone, thyroxin rich in iodine. Thyroid gets iodine from the blood stream. It is then fixed with the amino acids thyroxin compounds. Two molecules of di iodo – thyroxin combine to form thyroxin. Thyroid stimulating hormone (TSH) produced by the anterior pituitary lobe increases the activity of thyroid gland. Whenever, the thyroxin level falls below a particular level TSH is stimulated.

Functions of Thyroxin :

- Helps to regulate tissue growth and development
- Increases the metabolism and thus raises the body temperature
- Stimulates the cells to break down the proteins for energy.

- Decreases the break down of fats
- Increases the break down of body glucose and enhances the glucose absorption
- Helps in the conversion of beta – carotene into vit A

4.3.6 Parathyroid Glands

Parathyroid glands are small, oval structures usually arranged in pairs behind each thyroid. Parathyroids secrete parathyroid hormone (PTH). It regulartes the blood level of calcium. PTH acts on bones, the kidneys indirectly on the gastrointestinal tract.

Bone : PTH stimulates bone restoration and inhibits bone formation, resulting in the release of calcium and phosphate into the blood.

Kidney : PTH increases calcium reabsorption and phosphate excretion. PTH stimulates the renal conversion of vitamin D (1,25 dihydroxy vitamin D3). Active vitamin D then enhances the intestinal absorption of calcium. PTH is not under pituitary and hypothalamic control. The secretion of this hormone is directly regulated by a feed back system.

4.3.7 Adrenal Gland

Adrenal glands are small, paired highly vascularized glands located on the upper portion of each kidney. Each gland consists of two parts, the medulla and the cortex. Each part has distinct function and the glands act independently from one another.

Adrenal medulla : The adrenal medulla, the inner part of the gland consists of sympathetic post ganglionic neurons. Medulla secretes the catecholomines epinephrine, non eprophrine and dopamine Catecholomines which are considered the neurotransmitters. Catecholomines are essential parts of the body's response to stress.

Adrenal Cortex : The adrenal cortex is the outer parts of the adrenal gland. It secretes three types of Hormones.They are classified as glucocorticoides, mineral corticoids and androgens.

Cortico steroids are the hormones synthesized by the adrenal cortex (except androgens).

Cortisole regulates of blood glucose concentration. Cortisol increases blood glucose through stimulation of hepatic gluconeogenesis and inhibiting protein synthesis.

Aldosterone : It is a potent mineralo corticoid that maintains extracellular fluid volume. It acts at the renal tubule to promote renal reabsorbtion of sodium and excretion of potassium and hydrogen iron.

Adrenal androgens : It is secreted by the adrenal cortex .Adrenal androgens stimulates public and axillary hair growth and sex drive in females. In females androgens are converted to oestrogen in the peripheral tissue.

4.3.8 Pancreas

The pancreas is a long, tapered, labular, soft gland located behind the stomach and anterior to the first and second lumbar vertebra. The pancreas has endocrine and exocrine functions. Hormone secreting portion is Islets of Langerhans.

Islets consist of four types of hormone secreting cells, alpha, beta, delta, F cells.

Alpha cells - Glucagon

Beta cells - Insulin

Delta cells - Somatostain

F cells - Pancreatic polypeptide.

Glucagon is synthesized and released from pancreatic alpha cells in response to low level of blood glucose protein ingestion and exercise.

Insulin is the principal regulator of the metabolism and storage of ingested carbohydrates, fats and proteins.

In a nutshell, we can summarize that endocrine system helps to maintain physiological balance by sufficient production of hormones and by their normal function.

4.4 MUSCULO SKELETAL SYSTEM

We are aware that there are 206 bones in the human body divided into four categories

- Long bones (eg- femur)
- Short bones (eg- metacarpals)
- Flat bones (eg- sternum)
- Irregular bones (eg- vertebrae)

Figure 4.4 Skeletal system

Bones are constructed of cancellous (trabecular or spongy) of cortical (compact) bone tissue. Long bones are shaped like rods or shafts with rounded ends, the shaft is known as the diaphysis, is primarily cortical bone. The ends of long bones called epiphyses are primarily cancellous bone. Epiphyseal plate separates the epiphyses from the diaphyses and is the center for longitudinal growth in children. In adults it is calcified. The ends of long bones are covered at the joints by articular cartilage, which is a tough, elastic bonelike tissue. Long bones are constructed for weight bearing and movement. Flat bones are important site for haematopoesis and provide vital organ protection.

4.4.1 Bone Cells

The bone cells are mainly of 3 types

- **Osteoblasts** : Bone formation by secreting bone matrix
- **Osteocytes** : Mature bone cells involved in bone maintenance functions
- **Osteoclasts** : Multinuclear cells involved in destroying, resorbing and remolding bone

Covering the bone is a dense, fibrous membrane known as periostium which nourishes bone, allows for its growth, provides attachment of tendons and ligaments. The periosteum contains nerves, blood vessels and lymphatics. Endosteum is a thin, vascular membrane covering the marrow cavity of long bones. Bone marrow is a vascular tissue located in the medullary (shaft) cavity of long bones and in flat bones. Red bone marrow, located in sternum, ilium, vertebrae and ribs in adults, is responsible for producing red and white blood cells.

Bone formation : Ossification is the process by which the bone matrix is formed and hardening minerals are deposited in the collagen fibers. The collagen fibers give tensile strength to bone and the calcium provides compressionnel strength.

Hematopoesis : In the centre of diaphysis, there is the medullary cavity which has either red or yellow bone marrow. In children, red bone marrow is actively involved in hematopoesis. In adults, the medullary cavity of long bones is mainly of yellow bone marrow.

4.4.2 Anatomy of the articular system

The junction of 2 or more bones is called a joint. There are 3 kinds of joints

- **Synarthrosis** : immovable eg : skull sutures
- **Amphiarthrosis** : allows limited motion eg : vertebral joints, pubis symphysis and joints are separated by fibrous cartilage.
- **Diarthroses** : freely movable joints eg : hands

Types

- **Ball and socket joints** : Permit full freedom of movement
  Eg : hip, shoulder
- **Hinge joint** : Permits bending in one direction only eg:elbow and knee
- **Pivot joints**: Characterized by articulation between radius and ulna.
- **Gliding joints**: Allow for limited movement in all directions. eg: joints of carpel bones in the wrist.

The articulating bones are surrounded by a tough, fibrous sheath, which is the joint capsule. The capsule is lined with a membrane, the synovium which secretes the lubricating and shock absorbing synovial fluid into the joint capsule.

- **Ligaments** : Bind the articulating bones together

4.4.3 Anatomy of skeletal muscle system

Muscles are attached by tendons or apo neuroses to bones, connective tissue, other muscles, soft tissue or skin. The muscles of the body are composed of parallel groups of muscle cells enclosed in fibrous tissue called fascia.

Skeletal muscle contraction : Muscle fibers contract in response to electrical impulse delivered by an effector nerve cell at a motor end plate when stimulated, the muscle depolarizes and generates an action potential. These action potentials propagate along the muscle cell membrane

and lead to the release of calcium ions that are stored in specialized organelles called the sacroplasmic reticulum. When there is local increase in calcium ion concentration, the myosin and actin filaments slide across one another.

Types of muscle contraction :

Isometric contraction : The length of the muscles remain constant but force generated by muscles is increased.

Isotonic contraction : Is characterized by shortening of the muscle with no increase in tension within the muscle.

Myoglobulin is a hemoglobin like protein pigment present in striated muscle cells that transports oxygen.

Muscle tone : Relaxed muscles demonstrate a state of readiness to respond to contraction stimuli. This state of readiness is known as muscle tone and is due to maintenance of some of the muscle fibers.

Hypertrophy : Increase in size of the individual muscle fibers without an increase in the number of muscle fibers.

Atrophy : Decrease in size of the muscle due to ageing and disease.

It is a fact that the bones can break, muscles can tear, and joints also suffer with cetain problems. Musulo skeletal problems are common at any age group. The main cause is ageing and road traffic accidents. Therefore, we must take care of our skeletal system to be healthy.

4.5 REPRODUCTIVE SYSTEM

The reproductive system consists of those organs whose function is to produce a new individual.

Male and female sexual reproductive organs:

The sex organs in the male and female can be divided as

- Primary sex organs, i.e. which produce male and female gametes.
- Secondary (or accessory) sex organs, i.e. those concerned with the carriage of gametes and other functions.

Primary sex organs in male and female

There are a pair of testes producing spermatozoa (male gametes) while in females there are a pair of ovaries producing ovum (female gamete). These primary sex organs in addition to producing male and female gametes secrete male and female hormones as well.

Accessory sex organs in the male :

Epididymis gland, Vas deferens, Seminal vesicles, Prostrate gland, Urethra and Penis.

4.5.1 Male Reproductive System

There is one pair of testis, with one testis in each scrotal sac. The scrotum is a bag of skin having two separate compartments, one for each testis lying at the root of the penis. Each testis is oval shaped, measuring. 5x3x2 cm and weighing about 15 gms. Each testis is covered with a layer of fibrous tissue called tunica albuginea. Many septate from this layer divide the testes into pyramidal lobules in which lie seminiferous tubules and interstitial cells. The seminiferous tubules are concerned with the process of spermatogenesis. The interstitial cells called Ludwig cells lie between the tubules and secrete the testosterone (male sex hormone). From the lining of these tubules spermatozoa are produced by the process of cell division.

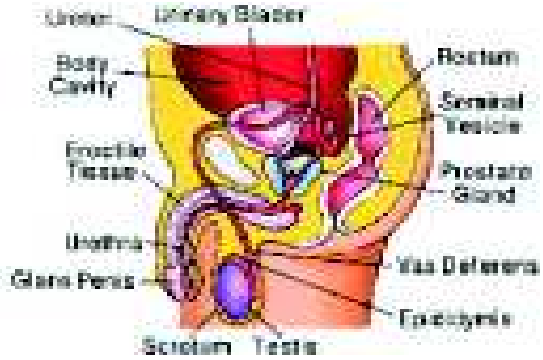

Figure 4.5 Male Reproductive Organs

The **epididymis** is a very fine convoluted tube, being 46 meters long and joints the posterior part of the testes and vas deferens. It stores the spermatozoa. The spermatozoa remain inactive in epididymis and are capable of surviving for months.

Vas deferens is a fibroelastic duct, 30-40cm in length and extends from epididymis to end in ejaculatory duct which is joined by seminal ducts and opens in to prostatic the urethra.

The **Seminal Vesicles** are little sacs one on each side of the urethra near the base of the bladder. They receive and store the sperms brought by the vas deferens. They also add a fluid to the semen. Their ducts pass through the prostate gland to the urethra.

The Prostate gland lies at the base of the urinary bladder and is covered with fibrous capsule which by a number of septa divides into many follicles. The prostrate adds another fluid to the semen, which makes the sperms more active in swimming to reach the ovum. In middle and old age, prostate glands may enlarge and cause urinary troubles.

The **ejaculatory ducts** lead from the seminal vesicle through the prostrate gland to the urethra. In males, the urethra is about 20-22 cm in length and serves the purpose of urination as well as ejaculation of semen.

The **Penis** is the external organ of both the urinary and reproductive systems in the male. It consists of spongy tissue with spaces for blood to rush into make the penis hard and erect. The end of the penis is called the glans penis. It is normally covered with a loose double fold of skin (The foreskin), which can be drawn back. The foreskin can be removed by circumcision.
The urethra passes through the penis and opens at the glans penis.

Functions of testis

- It produces and matures the male reproductive cells called spermatozoa.
- Secretes seminal fluid.
- Secretes hormone testosterone directly into the blood.

Functions of hormones

- Androgens : Maintains spermatogenesis and sexual activity.
- Testosterone : Stimulates the development of the secondary sexual characteristics of the male such as the growth of beard, the deepening of the voice, the growth and the distribution of hair on the body, the growth and development of the accessory sex organs. Stimulates the production of sperms at puberty.

4.5.2 Female Reproductive Organs

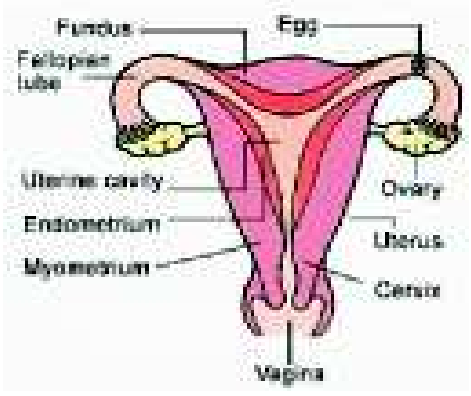

Figure 4.6 Female Reproductive Organs

These are divided into external organs and internal organs.

The External Organs

The Vulva : The external organs together form the vulva. They are as follows.

Mons veneris or pubic Mont : It lies over the symphysis pubis, and is covered with hair after puberty. Labia majora or the outer lips, form the sides of the vulva. Labia minora, or smaller lips, are within the labia majora. They are moist by gland secretions. Clitor is a small sensitive organ with erectile tissue similar to the male penis.

Vestibule: A triangular part between the labia minora. The urethral opening is in the vestibule in front of the vaginal opening.

Vagina: It is a muscular tube lined with membrane comprised of special type of stratified epithelium,well supplied with blood vessels and nerves. It extends from the vestibule to the uterus.

Perineum: This is the area of the skin from the vaginal opening back to the anus. It covers the perineal body, which is a wedge shaped structure between the vagina and lower part of the rectum. The muscle of the perineal body forms the main muscle of the pelvic floor. It flattens during the second stage of labour and quite often gets torn.

Internal organs

The internal organs, which are situated in the pelvis are as follows:

1) Fallopian tubes 2) Uterus 3) Vagina 4) Ovaries

Fallopian tubes : The fallopian tubes are two thin tubes connected to the sides of the uterus, just below the fundus. Each tube is about 10 cm long, curves backwards behind the uterus and around the ovary like an arch. The outer end widens and opens into the peritoneal cavity. This opening is surrounded by finger like processes called fimbriae, one of which is connected to the ovary. The fallopian tubes have walls of muscle and are lined with ciliated epithelium and covered with the peritoneum.

Functions : These tubes act as ducts for the female gametes although they are not connected to the ovaries. The function of the tube is to collect the ovum discharged from ovary and pass it along the tube. It is sent along partly by peristaltic action of the muscles and partly by waving movements of the cilia.Fertilization of the male and female gametes normally occurs in the tubes at the ampullary portion.

Uterus: Uterus is a pear shaped muscular organ, inside of which is hollow. It measures about 7.5 x 5x 2.5 cm and weighs about 60gm. It consists of an upper portion called the body and the lower portion called the cervix. The uterus is lined by a mucous membrane known as the endometrium. The uterus has three parts :

- Fundus, the upper part betweeen the two fallopian tubes.
- Body, the middle part , which has a triangular shaped cavity.
- Cervix, the lower narrow part, which projects into the vagina below. The cervix is about 2.5 cm long, and has a central canal with two circular openings, the internal os where it joins with the body of the uterus, and the external os, which opens into the vagina.

The wall of the uterus is in three layers

- Perimetrium, the outer serous layer
- Myometrium, the muscular layer, which is thick and strong
- Endometrium, the inner lining of special epithelial tissue. The narrow cavity of the uterus has three openings: one into each fallopian tube, and one through the external os of the cervix into the vagina

Functions

1) **Menstruation** : The thickened endometrium comes away causing bleeding of torn vessels, and the resulting menstrual flow is discharged through the vagina.
2) **Pregnancy:** The uterus receives the fertilised ovum and nourishes the developing foetus.
3) **Labour :** Contractions of the muscular wall cause the foetus and placenta to be expelled.
4) **Involution :** The gradual return to normal size of the uterus following delivery.

Ovary : The gonads of the females are called ovaries and the cells that they produce are known as ova or egg cells. Each female has a pair of oval shaped structure about the size of an almond. Each ovary measures 3.5x2.5 x 11.5 cm and weighs 8 - 10 gms. They are situated at the back of the abdominal cavity at the hip level. An ovary consists of the following :

- **The germinal Epithelium**: It is the outer part of the ovary from which the primitive graafian follicles develop.
- **Tunica albuginea** : This is made up of connective tissue found under the germinal epithelium.

- **Stroma:** It is the connective tissue network continuous with tunica albuginea and containing involuntary muscle fibres. It supports the ovarian tissues and carries blood vessels, lymphatic and nerves.
- **Graafian follicles** : These are small islands of cells found at the peripheral part of the ovary. The female gametes called ova are produced in the graafian follicle. When the ovum matures, the follicle in which it develops bursts. The follicle usually takes 10-14 days to rupture. This process of rupture of graafian follicle is called the "ovulation".
- **Corpus luteum** : When the follicle ruptures, corpus luteum develops. In the absence of pregnancy it persists up to 27 th day and degenerates on the 28 th day. If pregnancy occurs, it persists to about 4 - 5months. It secretes progesterone which is essential for the maintenance of pregnancy.
- **Interstitial cells** : There are polyhedral cells found in between the follicles. These cells secrete oestrogen.

Functions

- Produce ova and expel one at approximately 28 days interval during the reproductive life.
- Secretes hormones (oestrogen & progesterone). Oestrogen influence secondary sex characteristics and is responsible for the changes in the accessory organs of reproduction. The progesterone prepares the uterus for the reception of the fertilized ovum, implantation, the development of the placenta, development of the mammary glands, and inducing multiplication of the uterine muscle fibres.

4.5.3 The Breasts (Mammary Glands)

These are accessory to the reproductive system. They are present in an undeveloped form in the female before puberty, and also in the male. They are situated at the front of the thorax.

The fully developed female breast is circular in outline and curves outwards. The gland is divided into lobes by partitions of fibrous tissue. Ducts from the glandular tissue converge towards the nipple and open on its surface. During pregnancy, hormones from the pituitary and ovaries cause the breasts to increase in size and to secrete a small amount of fluid, which can be expressed from the nipples. This is in preparation for the function of lactation (milk production).

4.5.4 Menstrual Cycle

This means the cycle of changes that regularly take place in the lining of the uterus (endometrium) under the influence of hormones with the outward sign of menstruation or monthly periods of females.

Menstruation is a function of the uterus that starts during puberty at the average age of 13. It occurs on an average every 28 days, until it stops at 45 to 50 years (the menopause). The purpose of the menstrual cycle is to prepare the endometrium to receive the fertilized ovum. It becomes thicker, is soft and rich in blood supply. When no fertilised ovum arrives in the uterus, the endometrium breaks down and results in the menstrual flow. The endometrium bleeds for 3 to 5 days. The blood contains epithelial cells and mucus, and does not clot. The amount of fluid is normally from 30 to 180 ml in all. After menstruation, there is a period of repair for the endometrium, followed by a resting period and slow growth. During the middle of this resting period a new ovum is discharged from the ovary (ovulation).
The menstrual cycle contains the following phases.

- Pre menstrual period, with congestion in the uterus 7 days.
- Menstruation 5 days
- Period of repair 6 days
- Resting period with ovulation 10 days
- Total 28 days

Ovulation usually takes place midway between the beginning of two menstrual periods. This is time when the woman is fertile and pregnancy may occur. Menstruation stops during pregnancy and this is called amenorrhoea. The menstrual periods usually do not start again until breastfeeding is stopped.

4.5.5 Hormones and the Reproductive System

Hormones are most important in the working of the reproductive organs. At puberty, hormones from the anterior pituitary gland stimulates the sex glands (ovary in the female, testes in the male) to produce their sex hormones. The male hormones testosterone promotes the development of male characteristics. In the female, oestrogen, promotes development of the female sex organs and tissue growth for the development of feminine features.

4.6 THE SKIN

The skin includes the skin and its derivatives hair, nails, and glands. The skin is the body's largest organ and accounts for 15% of body weight.

4.6.1 The Layers of Skin

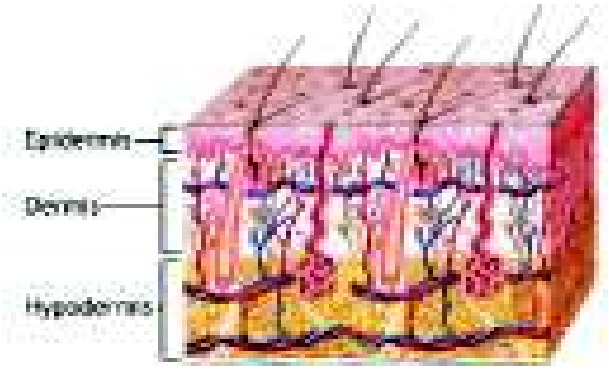

Figure 4.7 Layers of Skin

Epidermis : The Epidermis is the thinner most superficial layer of the skin. The epidermis is made up of 4 cell types :

- **Keratinocytes** : Produces keratin a fibrous protein that helps protect the epidermis
- **Melanocytes** : Produces the brown pigment melanin
- **Langerhan Cells** : Participates in the immune response
- **Merkel cells** : Participate in the sense of touch.

There are five distinct sub-layers of the Epidermis

- **Stratum corneum :** The outermost layer, made of 25-30 layers of dead flat keratinocytes. Lamellar granules provide water repellent action and are continuously shed & replaced.
- **Stratum lucidum :** Only found in the fingertips, palms of hands, and soles of feet. This layer is made up of 3-5 layers of flat dead keratinocytes.
- **Stratum granulosum :** It is made up of 3-5 layers of keratinocytes, site of keratin formation. Keratohyalin gives the granular appearance.
- **Stratum spinosum:** Appears covered in thorn like spikes, provide strength & flexibility to the skin.
- **Stratum basale:** The deepest layer, made up of a single layer of cuboidal or columnar cells. Cells produced here are constantly divided and move up topical surface.

Dermis : It is the deeper, thicker layer composed of connective tissue, blood vessels, nerves, glands and hair follicles. The epidermis contains 3 cell types: Adipocytes, Macrophages and Fibroblasts. There are two main divisions of the dermal layer

Papillary region - The superficial layer of the dermis, made up of loose areolar connective tissue with elastic fibres.

Dermal papillae - Fingerlike structures invade the epidermis, contain capillaries which respond to touch.

Reticular region of the Dermis – Made up of dense irregular connective & adipose tissue, contains sweat lands, sebaceous (oil) glands, & blood vessels. Melanin is the pigment that provides colour to the skin.

Hypodermis : It is the **subcutaneous layer** under the dermis made up of connective tissue and fat (a good insulator).

4.6.2 The Derivatives of the Skin

Hair : Hair is composed of columns of dead, keratinized cells bound together by extracellular proteins. Hair has two main sections: The shaft- superficial portion that extends out of the skin and the root- portion that penetrates into the dermis. Surrounding the root of the hair is the hair follicle. At the base of the hair follicle is an onion-shaped structure called the bulb Papilla of the hair. The matrix within the bulb produces new hair.

Nails: Nails help in the grasping and handling of small things. The nails is plates of tightly packed, hard, keratinized epidermal cells. The nail consists of nail root which is the portion of the nail under the skin, Nail body which is the visible pink portion of the nail. The white crescent at the base of the nail is the lunula, and secures the nail to the finger. The cuticle or eponychium is a narrow band around the proximal edge of the nail. Free edge is the white end that may extend past the finger.

Glands: They help in regulating body temperature. There are three main types of glands associated with the integument

Sebaceous - Oil glands. Located in the dermis, and secrete sebum.

Sudoriferous - Sweat glands. Divided into two main types

Ceruminous – Lie in the subcutaneous tissue below the dermis, secrete cerumen (ear wax) into ear canal or sebaceous glands.

4.6.3 Functions of the Skin

Skin provides a protective barrier against mechanical, thermal and physical injury and hazardous substances. Prevents loss of moisture.

Reduces harmful effects of UV radiation. Acts as a sensory organ (touch, detects temperature). Helps regulate temperature. An immune organ to detect infections etc. Produces vitamin D.

4.7 EYE, EAR, NOSE AND THROAT

As we have learnt skin as the sense organ, next let us study the other sense organs like eye, ear, nose and throat.

4.7.1 Eye

You first need to study the structures of the human eye and their functions. Knowing this will help you to understand about the different problems in the eye. As you read the following descriptions, see if you can identify the structures in Figure 4.8, which intentionally has no labels

Figure 4.8 The Human Eye, Front View

The eyeball is a small organ in size, only about 2.5 cm in diameter, but it serves a very important function, which is your sight. Vision is the primary means that you use to gather information from your surroundings. The eye is usually compared to a camera. Each eye gathers light and transforms it into signals to your brain, which interprets what you see as a picture or image. Both the eye and the camera have lenses to focus the incoming light so that the image formed will be clear and understandable.

Eyelids and eyelashes : The eyelids are muscular folds of skin above and below your eyes that can open and close like a gate covering and revealing the eye. They protect the eye from foreign matter, such as dust, dirt and other debris that might damage the eyes. When you blink, the eyelids also help spread tears over the surface of the eye, keeping it moist and comfortable. Eyelashes are small hairs growing from the edges of the eyelids. They

filter out dust and debris from the air close to the eye, preventing it from getting into the eyeball.

Sclera and conjunctiva : The sclera is a tough, leather-like, white tissue that extends all around the eye. Similar to an eggshell surrounding an egg and giving its shape, the sclera surrounds the eye and gives the eye its shape. The sclera is also attached to small muscles around the eye, which, in turn, move the eye left and right, up and down, and diagonally. When you look at yourself in the mirror the white part of your eye that you see is the front part of the sclera. Outside the sclera is a very thin transparent membrane, called the conjunctiva.

Cornea, iris and pupil : The cornea is a clear layer at the front of the eye which is continuous with the sclera, as you can see in Figure 4. 9. You can also see that the cornea is located in front of the iris. The main purpose of the cornea is to help focus light as it enters the eye. The iris is the coloured part of your eye and is made of muscle. The iris controls the amount of light that enters the eye through the pupil. The central opening in the ring-shaped muscular tissue of the iris is called the **pupil**, and the amount of light that enters the eye, can be altered by the iris changing its shape.

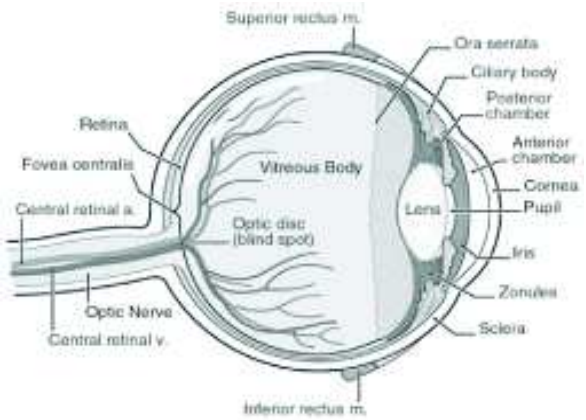

Figure 4.9 Cross Section of the Eye

Lens and Aqueous Humour : The lens of the eye is a clear flexible structure that is located just behind the iris and the pupil. The lens focuses the light as it passes through the eye onto the retina at the back of the eye. The aqueous humour (it means 'watery matter') is the fluid found just behind the cornea. Its function is to nourish the lens.

Retina : The retina is a complex layer of tissue at the back of the eye, where the image from the light entering the eye is focused. When light hits the retina, it sends signals to the brain along the optic nerve. The brain interprets

these signals and turns them into information about what the eye is seeing. Damage to any of the structures of the eye due to physical injury or infection, or their gradual wearing out due to age, reduces the quality of vision. There are several eye problems that are common among people as they grow old. They include blurred vision, far vision, near vision, cataract, glaucoma where all these conditions will be dealt in module II.

Now try this exercise to test your knowledge of the structures of the eye.

4.7.2 Ear

The ear is divided into three large parts: The external ,middle and inner ear.

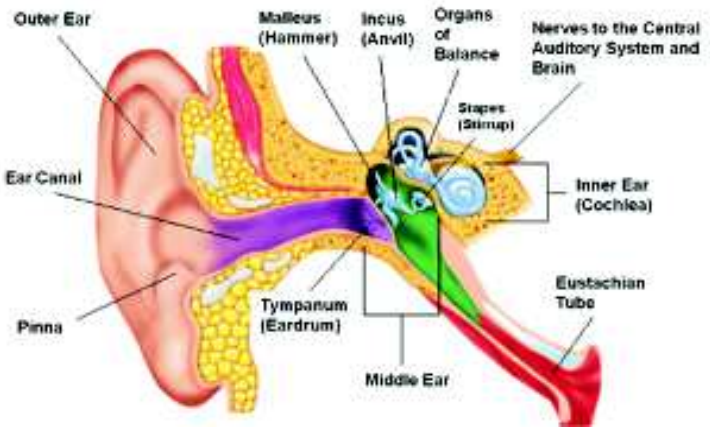

Figure 4.10. Structure of Ear

The External Ear : We know that the outer ear comprises of the pinna and the external auditory meatus. The outer part of this is cartilaginous. The deep part is bony. The cartilaginous part contains hair follicles and glands which secrete wax. The hair follicles extend only for a short distance into the ear and are not found in the deeper parts of the external meatus. The external meatus varies in size and form with growth.

The Middle Ear : It consists of the tympanum , Eustachian tube and mastoid antrum and cells. The tympanic membrane consists of three layers - an outer epithelial layer, a middle layer of yellow elastic fibrous tissue and an inner layer of mucous. The middle ear can be divided into three portions. The uppermost portion is the attic, the middle portion the mesotympanum , and the lowest portion the hypotympanum . The attic is that part of the middle ear above the level of the mallear folds. It is divided into a number of small pockets by the contained ossicles, their ligaments and mucosal folds. Chronic infection may localize in these spaces. It should be noted that the middle ear extends beyond the limits of the drum.

The Ossicles of the Middle Ear : The middle ear is an air-containing space and contains three ossicles: the malleus, incus and stapes. The handle of the malleus is firmly embedded in the middle layer of the drum. The stapes footplate occupies the oval window of inner ear.

The inner ear : The inner ear consists of cochlea which helps in maintaining the balance.

4.7.3 Nose and throat

The external nose is supported by bone and cartilage. The bony part is formed mainly by the nasal bones on each side, and the frontal process of the maxillary bone. The cartilaginous portion is formed by several cartilages which support and give shape to the lower part of the nose and nasal tip. The nasal cavity is divided by the nasal septum into two parts which have similar anatomical structure but may be asymmetrical. For details refer unit III (Part A) respiratory and digestive system.

4.8 SUMMARY

- The body consists of the head, neck, trunk, upper limbs, and lower limbs.
- The body has a strong framework of bones called the skeletons.
- There are spaces called cavities in which important organs are protected. eg. the cranial cavity contains the brain.
- Skeletal system, muscular system, nervous system, circulatory system, digestive system, respiratory system, excretory system, endocrine system, and reproductive system are the systems of our body.
- Nervous system has two parts: central nervous system and autonomic nervous system. The central nervous system is made up of the brain and cranial nerves, spinal cord and spinal nerves.
- The main endocrine glands in the body are thyroid, para thyroid, adrenal and pituitary glands.
- The endocrine glands produce a chemical substance, hormone, which regulates the activities of various organs and their functions.
- Skin is the largest organ which provides protection.
- Eyes help to maintain normal vision.

4.9 SELF ASSESSMENT QUESTIONS

A. Fill in the blanks :

1. The structural and functional unit of brain is————————————
2. Weight of the adult brain is————————————
3. ———————————— is the covering of brain
4. Brain is covered in ————————————liquid
5. ———————————— divides the brain in to two hemispheres
6. Transmission of impulses takes place by ————————————
7. ————————————is the bony part which covers the brain
8. Insulin is produced by———————————— gland
9. ———————————— is called as the master gland
10. Growth hormones are produced by ———————————— gland
11. Deficiency of ———————————— hormone causes diabetes mellitus
12. ———————————— hormone is responsible for glucose metabolism
13. The two types of glands are ———————————— and ————————————
14. Enlargement of thyroid gland is called as————————————
15. ———————————— is the largest bone in our body
16. The muscle which connects two bones in the joints is called——
17. The movable bone in the face is ————————————
18. The fluid present between the joints is ————————————
19. ———————————— is a mineral responsible for strengthening of bone
20. ———————————— is a smallest bone in our body
21. ———————————— pairs of ribs present in our body
22. The sex organs in the male and female can be divided as ———— ————and ————
23. —— are most important in the working of the reproductive organs
24. Menstruation is a function of the ——— that starts during puberty at the average age of ————————————
25. The gonads of the females are called ————————————

B. Are the following statements true or false?

1. The pancreas has both endocrine and exocrine functions.
2. Homeostasis of hormonal secretions is maintained only by negative feed-back mechanisms.
3. The hypothalamus has a posterior and anterior lobe.
4. Oxytocin is produced by the pineal gland.
5. Body hair is produced in response to follicle-stimulating hormone.

6. Oestrogens are present in males.
7. Secretion of antidiuretic hormone increases urine production.
8. The principal actions of thyroid hormones increase the basal metabolic rate.
9. Calcitonin is produced by the thyroid gland.
10. Bone resorption is facilitated by the action of the parathyroid hormone.
11. The adrenal glands can be structurally and functionally differentiated into two distinct regions.
12. Glucocorticoids suppress the immune system.
13. The hormones produced by the adrenal medulla have major effects on heart rate and blood pressure.
14. All endocrine glands store the hormones they produce
15. Eye lashes protect the eye from foreign matter, such as dust, dirt and other debris that might damage the eyes.
16. The lens of the eye is a clear flexible structure that is located just front of the iris and the pupil

C Answer the following in one sentence.

1. Mention any two functions of skin.
2. List the layers of skin
3. Which gland secretes the ear wax?
4. Name the pigment which gives color to the skin.

4.10 GLOSSARY

Anabolism : The phase of metabolism in which simple substances are synthesized into complex materials of living tissue

Catabolism : Biochemical reactions that break down molecules in metabolism.

Hematopoiesis : Formation and development of blood cells.

Resorb : To absorb again.

4.11 SUGGESTED READING

1. Tortora J.G, Derrick B.: Principles of anatomy and physiology.ed-11,USA 2006 : John Wiley & sons publishers.
2. Douglas G, Nicol F, Robertson C : Macleod's clinical examination. ed-11, Philadelphia 2005. Churchill Livingstone publishers.

(200

4.12 REFERENCES

1. Mareib N.E : Essentials of Human Anatomy & Physiology, eg : 8, 2006, Delhi.
2. Waugh. A Grant, A. W, Chambers, Ross, J. S., Wilson KJW : Anatomy and physiology eg. 9, 2006. Churchill Livingstone.

NURSING ASSISTANCE

5

NUTRITION AND BALANCED DIET

Structure

5.0 INTRODUCTION

Food is the basic need of all the living beings. Food gives us the energy to perform all the necessary actions and sustains the life. The food we consume is a mixture of various nutritional components (commonly called as nutrients) such as carbohydrates, proteins, fats, vitamins and minerals. The food or the diet that contains all the necessary nutrients and the energy for proper functioning of the body is called a balanced diet. The amount of energy provided by the food we consume is measured in terms of calories. Generally a person's daily calorie intake is based on age, gender, and physical activity level. Men generally need more calories than women, and active people need more calories than sedentary (inactive) people.

Imbalance of nutrients in the food causes several health problems. This phenomenon where a person does not receive adequate nutrition or receives excess nutrition in the form of energy, protein, carbohydrates, fats or micro-nutrients such as vitamins and minerals is called malnutrition. The condition of receiving inadequate nutrients is called undernourishment/ under-nutrition while receiving in excess is called over-nutrition.

The food we consume is generally prepared/ cooked; which involves combining various food ingredients in different ways with delicate flavours, textures and colour which appeal to senses. Food preparation is an important step in meeting the nutritional needs of the person. Cooking improves the digestibility of the food and removes various microorganisms present in the raw food like vegetables or meat. However, foods like fruits, certain vegetables like carrot nuts are eaten raw without cooking. The process of subjecting foods to the action of heat is termed as cooking. Further, cooked foods must be preserved for maintaining their nutritional benefits.

Sometimes special diets are essential for controlling/reducing the negative effects of various nutrition related disorders and diseases. Several diseases/disorders occur due to improper nutrition and deficiency of micro-nutrients. The most common disorders that occur due to improper nutrition and food habits are type-2 diabetes, high cholesterol and obesity which lead to life threatening diseases like heart diseases and kidney failure.

The present unit would discuss the importance of balanced diet and the nutritive value of commonly eaten foods. The nutritional value of the

foods are further emphasized with detailed description of diseases caused due to deficiency of these nutrients. Further, various methods of cooking and its importance is discussed in detail for better understanding of our daily foods. Moreover special emphasis is given to food habit in this chapter as a precautionary measure to avoid nutrition related disorders. In addition to the importance of balanced diet and importance of cooking and food preservation, special diets for common disorders like type-2 diabetes, high cholesterol and obesity will be discussed.

5.1 OBJECTIVES

After reading this lesson you should be able to-

- Define various nutrients commonly present in foods
- Differentiate between macronutrients and micronutrients
- State the functions of various nutrients in food.
- Elaborate on recommended dietary intake.
- State the effects of malnutrition
- Explain the role of special diet and nutrition for these diseases

5.2 NUTRITIVE VALUE OF FOODS

Some of the common foods we daily consume are composed of cereals, millets, fruits, vegetables, egg and milk. We generally cook these foods,mainly cereals and vegetables, in the form of rice, curry and breads; while we consume the fruits either directly or as juice or salads. The nutrients present in these foods can be broadly divided into two groups namely macronutrients and micronutrients.Macronutrients are required in large quantities and are mainly used as source of energy while micronutrients are required in very small quantities such as vitamins and trace minerals which regulate the various essential functions in the body. The amount of energy supplied by any food substance is represented as kilojoule (KJ) or as kilocalories (kcal).

Macronutrients are carbohydrates, fats and proteins which provide structural material for the body and energy. One gram of carbohydrate and protein gives four calories while one gram of fat gives nine calories.

Carbohydrates Are made of sugars which are either simple like glucose, fructose, galactose or complex chain of sugars called polysaccharides like starch.

- Carbohydrates are made of carbon, hydrogen and oxygen atoms.
- Carbohydrates are the primary source of energy and form the bulk of the food we consume.
- The common sources of carbohydrates in our daily food are rice, wheat, ragi, sugar and tuberous vegetables like potato, tapioca, etc.,

  Proteins are the second major macronutrient that contribute to the formation of various structures such as muscles, skin and hair.
- Protein are made up of small building blocks called amino acids. The amino acids/proteins are made of carbon, hydrogen, nitrogen and oxygen atoms. These amino acids are further subdivided into essential and non-essential amino acids.
- Essential amino acids are those which cannot be synthesized by animal or human body and are mainly obtained from food sources; while non-essential amino acids can be synthesized from other nitrogen containing compounds by the animal or human body.
- As mentioned earlier proteins are essential for body structure formation. Some common food sources rich in proteins are milk, egg, fish, meat, cheese legumes like dhal, grams and soybean.

  Fats are the third major class of macronutrients involved in the formation of cellular structures like cell membrane and also as source of energy.
- We consume fats in the form of cooking oil. Fats are made of two important building blocks namely glycerol and fatty acids. Similar to amino acids, fatty acids are also classified as essential and non-essential based on the ability of the animal/human body to synthesize them.
- Fats are primarily made of carbon, hydrogen and oxygen atoms and sometimes with nitrogen atoms. Some common sources of fats are coconut oil, sunflower oil, rice bran oil, olive oil, groundnut oil ghee, butter etc.

  Micronutrients are essential substances that are required at very low concentrations (quantities) for proper functioning of body and metabolism. Vitamins and minerals are the two major nutrients classified under the category of micronutrients.

  Vitamins are special class of organic chemicals that commonly acts as co-factors for enzymes, which act as catalysts for the various metabolic processes.

- The vitamins are broadly classified as water soluble and fat soluble vitamins.
- Vitamin A, D, E and K constitute fat soluble vitamins while vitamin B complex containing vitamin B1, B2, B5, B12 and vitamin C constitute water soluble compounds.
- Vitamins are essential nutrients for the healthy maintenance of the cells, tissues, and organs. For example vitamin A is required for eye development while vitamin D is essential for bones and skin formation and its health.
- Vitamin B complex and vitamin C are important for maintenance of various metabolic processes occurring in liver, kidney and blood tissue.

  Minerals are the second important class of micronutrients. Based on the requirement, minerals are classified as macro-minerals and trace minerals.
- Macro-minerals are those elements which are required greater than 150 milligram per day such as calcium, chlorine, magnesium, phosphorus, potassium, sodium and sulphur.
- These macro-minerals act as co-factors for enzymes, required for proper functioning of nerves and tissue formation. For example calcium and phosphorus are required for bone formation, sodium and potassium are required for proper functioning of nervous system while sulphur is required for formation of sulphur containing amino acids like cysteine and methionine in proteins.

The trace minerals are those elements required below 150 milligram per day. The primary role of these trace minerals are as co-factors required for enzyme function. For example, cobalt is required for synthesis of vitamin B12, chromium required for sugar metabolism, iron required for haemoglobin formation while zinc and copper are required for proper functioning of liver enzymes.

The list of important nutrients and their common food sources along with their functions is listed in Table 1.

Table 1: Classification of common food sources

Nutrients	Common Food sources	Function
	Macronutrients	
Carbohydrates Starch/Sugars Fibre	rice, wheat, ragi, bajra, Maize, Corn, Potato, Sugar	Major source of energy
Proteins	Egg, Meat, fish, milk, Soybean, Pulses like Redgram, wholegram, groundnuts etc.	growth and develpment: Repair body tissues formation of antibodies, hormones
Fat	Cooking oils, Coconut, Mustard, Sunflower, Safflower, Soyabean, Rice bran, Olive, Cashews, Almonds, butter, ghee	Source of energy; Protects organs
Essential fats	Fish (Salmon, Mackerel, Sardine)	Required for Brain development, Nerves (Neuron) formation, Proper functioning of heart
	Micronutrients	
Vitamin A	Carrot, Green leafy vegetables, Egg yolk, Papaya, fish, liver, Oil	Required for proper vision
Vitamin B complex	Cereals, Pulses, Egg, Fermented foods	Required for proper functioning of muscles and organs
Vitamin C (Ascorbic acid)	Citrous fruits – Orange, Lemon, Goseberry Sweetlime	Required for general health maintenance anti-oxidant wound healing
Iron	Dates, Jaggery, Drumstick leaves Pomegranate, Ragi, Green leafy vegetables	Required for haemoglobin formation
Calcium	Milk, Ragi, Greens	Required for bone formation
Potassium	Banana, Oranges, Lemon coconut water, sweet lime	Required for proper nerve (neuron) function

After deliberating on the nutritive value of food lets us now understand the concept of Balanced diet.

5.3 THE CONCEPT OF BALANCED DIET

A balanced diet is important for proper functioning of vital organs and tissues. A balanced diet contains foods high in vitamins, minerals, and other nutrients and low in unnecessary fats and sugars. Further, a balanced diet contains both the macro and micronutrients at a required levels specific to each age group and gender satisfying the needs for proper functioning of metabolism. A person, especially a child, who does not get a balanced diet, is prone for various health problems. Children pose a greater risk of growth retardation and development when proper nutrition is not provided to them.

A balanced diet is generally obtained only by eating combination of healthy foods such as cereals, nuts, pulses, fruits, vegetables and milk. Food products that provide energy from only sugar or fat and do not give any nutritional value are called empty foods and the energy provided by them are termed as empty calories. Some of the foods that provide empty calories with no extra nutritional value are sport drinks, aerated drinks, sodas, bacon, sausages, cookies and cakes. A balanced diet does not contain these empty foods.

The first important requirement for any balanced diet is the total energy or calories that it provides. As mentioned earlier, the energy requirements vary between the age groups and gender. Following table gives minimum energy intake in total calories for various age groups and gender based on the recommendations and guidelines by World Health Organization (WHO) and U.S. Department of Agriculture (USDA).

Table 2: Minimum Energy Requirements of Different Age Groups

Age group	**Minimum calories required**
Children - 2 to 8 years	1000 – 1400 calories
Active women – 14 – 30 years	About 2400 calories
Sedentary women – 14 to 30 years	1800 – 2000 calories
Active men – 14 to 30 years	2800-3000 calories
Sedentary men – 14 to 30 years	2000-2600 calories
Active men and women above 30 years	2200 – 3000 calories
Sedentary men and women above 30 years	1800 – 2200 calories

The balanced diets are classified into various groups like basic four, basic five and basic seven based on recommendations by Indian Council of Medical Research (ICMR). In planning balanced diet, food should be chosen from each group in sufficient quantities. Cereals and pulses should be taken adequately, fruits and vegetables liberally, animal foods moderately and oils and sugar sparingly. Generally the most preferred wholesome diet involves basic five prescribed by ICMR. This includes

- Cereals and grain products such as Rice, Wheat, Ragi, Jowar, Bajra, Rice flakes, Puffed rice etc.,
- Pulses and legumes such as Bengal gram, Black gram, red gram, green gram, Cow pea, Peas, Soyabean, Rajma, kidney bean etc.,
- Milk and meat products like Milk, Curd, Cheese, Chicken, liver, Fish and Meat
- Fruits like Mango, Guava, Papaya, Orange, Water melon, Sweet lime and vegetables like Carrot, Onion, Brinjal, Drumstick, Cauliflower, Beans, Capsicum and green leafy vegetables like Amaranth, Spinach, Coriander leaves
- Fats like Butter, Ghee, Cooking oil and sugars like Jaggery, White sugar

5.4 PREPARATION AND PRESERVATION OF FOOD

Preparation of Food Humans do not have the ability to digest many food substances in their raw form. For example, food substances which have high nutritional value such as cereals, pulses, high fibre containing vegetables, green leafy vegetables like amaranth and spinach cannot be digested in their raw form and require further processing in the form of cooking. Cooking basically involves heating the food substances in the presence of water or cooking oil for easy digestion. Apart from improving the digestibility, cooking has many advantages such as

- Improves the taste (flavour) and texture of the food
- Destruction of microorganisms
- Improves digestibility especially for cereals and meat
- Concentrates nutrients and increases their availability by reducing the moisture

- Cooking destroys anti-nutrients such as trypsin inhibitor, phytic acid, avidin

Food such as cereals and vegetables contain anti-nutrients such as trypsin inhibitor, phytic acid, avidin which bind to various micronutrients and proteins making them unavailable for the body. Trypsin inhibitor binds to the enzyme trypsin and block its function; trypsin is a very essential enzyme for digestion. Similarly, avidin an anti-nutrient in egg that binds to biotin (Vitamin) reducing its availability to body. Similarly phytic acid present in cereals and pulses which bind to the grain proteins and reduce their availability to body. Cooking with water destroys these anti-nutrients thereby improving nutrient accessibility to body.

Further, cooking destroys various enzymes that may cause spoilage of food. For example, tomatoes, potatoes, carrots, beans are cooked by the process of blanching to inactivate the enzymes that may spoil the food.

Cooking involves various methods where water, steam, air or fat or combination of these are used as cooking media. Use of water and steam is called wet/moist cooking while use of air and fat is called dry heating.

Table 3: Classification of different cooking methods

Moist heating	Dry heating
Boiling – Cooking foods by just immersing them in water at 100°C.	**Roasting** - Food is cooked uncovered on a heating pan.
Simmering – Food cooked in closed lid at temperatures less than boiling point 82°C -99°C.	**Grilling** – Heating food by placing them above or below or in between red hot surface. Food is cooked by heat radiation. Results in browning of food.
Poaching – Cooking in minimum water at a temperature of 80°C -85°C.	**Baking** - Food gets cooked by hot air combined with steam.
Stewing – Slow heating of food in minimum quantity of liquid at simmering temperatures.	**Sautéing** – Cooking food in just enough of oil to cover the base of the pan.
Blanching - Cooking food in boiling liquid and immersing in cold water. Destroys unwanted chemicals in foods.	**Deep fat frying –** Food is totally immersed in oil and cooked by heat. Cooking is uniform on all sides of food.
Steaming – Food is cooked in steam at 100°C.	
Pressure cooking – Food is cooked under steam and high pressure in a closed container called pressure cooker.	

Apart from heating, other process of food preparation involves germination or sprouting where pulses like Green gram, Bengal gram, Peas, cereals like Ragi and Wheat are allowed to sprout or germinate. Sprouting improves the protein content of these cereals and pulses. Germinated foods provide essential proteins to growing children.

Fermentation is another process where the complex substances are broken down into simpler ones by the aid of bacteria and enzymes. Fermented foods are highly nutritious than unfermented foods. Some of the common fermented foods are curds, idli, bread etc. Fermentation improves texture, taste and bioavailability of amino acids and B vitamins.

5.4.1 Food Preservation

Preservation of food involves prevention of growth of bacteria, fungi (such as yeasts), or other micro-organisms and retarding the oxidation of fats that cause rancidity. Further food preservation include processes that inhibit visual deterioration, such as the enzymatic browning reaction in apples, potatoes after they are cut during food preparation.

Heating is a commonly used method for food preservation specifically to destroy microorganisms. For example, boiling of milk, heating cooked food like curries prevent their spoilage. On the other hand, cooling or freezing food substances also prevents microbial growth. Addition of salt called as curing is also a common method to preserve meat. Addition of salt absorbs all the moisture in the food substances and inhibits growth of micro-organisms.

Pickling is also a commonly used method to prevent microorganism's growth. Pickling involves addition of oil, brine solution (high in salt) and vinegar to food. For example, few vegetables/fruits and meat are general pickled for long term storage. Other processes include canning of fruits and vegetables. In this process, food is cooked and sealed in a sterile cans or jars, followed by boiling the containers to kill or weaken any remaining bacteria as a form of sterilization.

Pasteurization is another process for preservation of liquid foods such as milk and other dairy products. In this method, milk is heated at about 70 °C for 15 to 30 seconds to kill the bacteria and cooling quickly to 10 °C to prevent the remaining bacteria from growing.

The pasteurized milk is then stored in sterilized bottles or pouches in refrigerated conditions. This method is named after a French chemist, Louis Pasteur who invented this process of sterilization.

5. 5 MALNUTRITION

Malnutrition/malnourishment is a condition resulting from eating a diet deficient in nutrients or is a condition that results from eating a diet containing excess of nutrients. The nutrients include energy (calorie), proteins, carbohydrates, fat, vitamins and minerals (both macro- and trace minerals). However, malnutrition is generally referred to under-nutrition. Extreme under-nourishment is called as starvation that include symptoms such as short height, thin body, very poor energy levels, and swollen legs and abdomen.

Under-nutrition is a common phenomenon observed during poverty and commonly seen in poor countries like Sub-Saharan African countries, certain parts of India, parts of south-east Asian countries. The under-nutrition is of two main types, which are protein-energy malnutrition and other dietary deficiencies. Protein-energy malnutrition refers to diets containing inadequate quantities of protein and results in two major diseases namely, marasmus (lack of protein and calories) and kwashiorkor (lack of just protein). Whereas micronutrient deficiency is caused due to lack of vitamins and minerals such as vitamin A, vitamin B12, iron, iodine, folic acid etc.

Malnutrition increases the risk of infection and infectious diseases, and moderate malnutrition weakens immune system. Malnutrition is considered as one of the major factors for spreading of tuberculosis infection. Further, under-nutrition promotes HIV transmission by increasing the risk of transmission from mother to child as the immune system is weak. In addition, protein energy malnutrition and iodine deficiency causes cognitive impairment i.e. mental retardation.

5.5.1 Malnutrition Diseases

The major diseases occurring in regions of extreme poverty, famine and low economy countries are kwashiorkor and marasmus. However, apart from these two diseases, several diseases have been identified with dietary deficiencies of micronutrients. The list of various diseases caused due to under-nutrition is presented in Table 4. Among these diseases, kwashiorkor and marasmus deserve special mention as many children are affected.

Kwashiorkar means displaced child. It is mainly caused due to inadequate protein intake resulting in a low concentration of amino acids. The main symptoms are swelling, muscle wasting, liver enlargement, and possible depigmentation (de-coloration) of skin and hair. Further, kwashiorkor is identified by swelling of the extremities and belly, which is deceiving of the actual nutritional status.

Marasmus means to waste away. This is observed as result of lack of food or prolonged survival in famine where the food is inadequate in energy and protein levels. The major symptoms are muscle wasting with very minimal fat content giving an appearance of skeleton. These symptoms are together called anorexia. Occurrence of marasmus in children cause growth retardation such as stunted growth.

Table 4: Diseases caused due to malnutrition

Disease	Cause	Symptoms
Kwashiorkar	Protein deficiency	Swelling of ankles and feet, Distended (enlarged) abdomen, Enlarged liver Thinning hair, Loss of teeth, Skin depigmentation (de-coloration)
Marasmus	Deficiency of all major nutrients especially proteins and carbo-Hydrates	Loss of muscle (muscle wasting), Susceptible to secondary infections, retarded growth, 'old man look'
Blindness/ loss of vision	Deficiency in vitamin A	Night blindness, poor or loss of vision
BeriBeri	Deficiency in Vitamin B1 (Thiamine)	Weight loss, Impaired sensory perception, Weakness and pain in the legs, Irregular heart rate, Swelling of body tissues
Pellagra	Deficiency in Vitamin B3 (Niacin)	Diarrhoea (loose motion), Dermatitis (skin lesion, bleeding), Weakness, Swelling in tissues, Weight loss, Ataxia (lack of co-ordination), mental confusion
Scurvy	Deficiency in Vitamin C	Skin roughness, Easy bruising, Bleeding of gums, Mouth ulcers, Loss of teeth, Dry mouth and dry eyes,Poor wound healing
Rickets/ Osteoporosis/ Tetany	Deficiency in Vitamin D Deficiency in Calcium	Bone tenderness (causing bending of bones), Increasing tendency for fracture of bones, Dental problems, Skeletal deformity in children, Uncontrolled muscle spasm (tetany)

Disease	Cause	Symptoms
Goitre	Deficiency in Iodine	Impaired function of thyroid gland, Mental retardation, Swelling of thyroid glands, Hypersensitivity to infections
Anaemia	Deficiency in Iron	Fatigue, Weakness, Breathing problems, Hair loss, Palpitations
Growth retardation	Deficiency in Zinc	Reduced mental and physical growth

5.5.2 Diseases Caused Due to Over-nutrition

Over-nutrition is a phenomenon where nutrients are provided in excess. The amount of nutrients generally exceeds the amount required for normal growth, development, and metabolism. Obesity is the major form of over-nutrition where excessive fat is accumulated in the body. Obesity is generally caused due to excessive food intake including empty foods (snack or junk food) with no nutritive value and very less physical activity. Overweight is a milder form of obesity, where a person's body weight is relatively more with respect to his height. The presence of obesity or overweight can be identified by measuring the body mass index (BMI) of a person. BMI is obtained by dividing a person's weight by the square of the person's height. If a person's BMI exceeds 30kg/m^2 he/she is considered as obese and if BMI is between 25-30 kg/$m^2$the person is considered overweight. Obesity increases susceptibility to heart diseases, arthritis (knee pain), type-2 diabetes and obstructive sleep disorder.Similarly, excess intake of vitamins and trace minerals could cause vitamin or mineral poisoning. For example, excess intake of sodium can cause impairment of nervous system similarly excess aluminium can cause central nervous system disorders.

5.6 SPECIAL DIETS FOR DIFFERENT PATIENTS

It is necessary to understand the special diets for the most prevalent diseases such as Diabetes, High cholesterol, Obesity and heart diseases. Now let us discuss in detail about each disease.

5.6.1 Diabetes

Diabetes is a group of metabolic disorder caused due to high blood sugar for prolonged period of time. The symptoms include frequent urina-

tion, increased thirst and increased hunger. Long-term complications of diabetes include cardiovascular disease, stroke, chronic kidney failure, foot ulcers, and damage to the eyes. Diabetes is mainly caused either due to pancreas not producing enough insulin or the inability of the cells to respond to insulin produced, the sugar the end product of metabolism is not converted for the use of the body.

Diabetes can be controlled by proper diet, physical exercise, maintaining normal body weight, avoiding alcohol and tobacco. Diabetic patients must take proper care of their foot and control their blood pressure. A healthy diet is essential in controlling diabetes. The quantity of food mattrs. A diet is recommended based on the age, activity of a person with the intake of a diabetic drug/ insulin to utilise the food. Body needs more time to digest high fibre foods thereby reducing the increase in blood sugar level and control of diabetes. Some of the high fibre food are amaranth, asparagus, bitter guard, carrots and sprouted pulses.In addition, whole grain food such as brown rice (unpolished rice), whole wheat flour, corn meal, oat meal, sorghum and ragi have been suggested. This is because the outer layers of grains and cereals contain various micronutrients such as minerals, vitamins and essential fats which improves the health of the patients and control blood sugar.

Starchy foods like polished rice, potatoes, and banana should be taken as recommended. Further foods that are high in empty calories must be avoided since they increase the total calorie intake and consequently high blood sugar level.

5.6.2 Hypertension, High Cholesterol, Obesity and Heart Diseases

The presence of high amounts of cholesterol and fats in blood is called hypercholesterolaemia or dyslipidemia. Cholesterol and fat are not soluble in water and they are found attached with proteins in the form of lipoproteins. These lipoproteins are of two types, high density lipoproteins (HDL) and low density lipoproteins (LDL). Excess of HDL cholesterol is considered good while excess LDL cholesterol is considered harmful. Excessive cholesterol increases the risk of heart diseases.

The major symptoms of hypercholesterolaemia are excessive fat deposits in body. Further occurrence of high cholesterol for prolonged period of time can lead to formation of plaques in heart which leads to blockage of arteries (blood vessel) and consequently heart attack. Blocking of

arteries leads to reduced blood flow to organs thereby causing number of secondary symptoms such as chest pain, pain in the calf muscles while walking, weakness, transient visual loss, abdominal pain after eating meal.

A healthy diet has a major preventive role in control of high blood cholesterol. Foods low in fat is very essential for controlling excess fat accumulation in body. Consumption of oily foods rich in saturated fats like margarine, vanaspati should be avoided since saturated fats can promote fat accumulation. Similarly consumption of foods rich in sugars must be avoided because high sugar intake promotes fat accumulation in body. In addition, consumption of high salt foods (sodium) must be avoided.

Eating foods high in fibre has been shown to control cholesterol levels in blood. Fibre and other nutrients from whole grains called plant sterols delay the absorption of cholesterol in the intestines thereby controlling cholesterol levels in blood. Further eating foods rich in unsaturated fats (essential fats) like omega -3, fats like fish, flax seed oil, rice bran oil control accumulation of excess fats. Apart from eating healthy food, physical activity is essential in controlling the cholesterol level. Sedentary life style and eating empty foods with no nutritional value must be avoided for controlling high cholesterol levels.

According to recommendations by American Heart Association and Ottawa Cardiovascular Centre, following diet and lifestyle can be followed for high cholesterol patients

- Eating plenty of vegetables and fruits atleast 7 servings or more each day
- Eating of whole grain foods rich in soluble fibre such as wheat, ragi
- Inclusion of foods rich in omega 3 fats such as mackeral, sardines 2 times a week
- Inclusion of pulses rich meals at least 2 times per week – kidney beans, chickpeas, lentils
- Eating of nuts such as almonds and walnuts – small portions 5 times a week
- Eating low fat diet, avoiding deep fried oily foods
- Physical activity for at least 30 minutes
- Limiting sugar and alcohol intake.

Similar diets containing whole grains, essential fats, low fat and low sugar diets have been suggested for obesity also. Obesity is primarily caused due to consumption of excess fat and sugar containing diets along with sedentary lifestyle.

5.6.3 Special Diets for Ageing People

Geriatric nutrition refers to diets and nutritional requirements of very elderly aged persons. Older persons are particularly vulnerable to malnutrition due to slow metabolic process and reduced digestion capacities. The process of ageing affects nutrient needs especially macronutrients such as fats. Due to reduced food intake and ageing process, several age related degenerative disorders occur. Since geriatric people do not have the ability to consume and digest regular foods, a special diets dense in calories and micronutrients such as fruits, essential omega-3 fats, milk whole grains are important. The nutrient requirements of geriatric people are different since they are susceptible to many age related metabolic disorders.

The most commonly occurring age associated disorder is bone deformity mainly osteoporosis in women. Osteoporosis leads to bone fracture. Women are at greater risk because their bone loss accelerates after menopause. Osteoporosis occurs due to reduced calcium absorption in the body and hormonal imbalance. Age related bone abnormalities can be reduced by calcium supplementation and consumption of calcium rich foods such as milk, green leafy vegetables and ragi. According to World Health Organization (WHO) a minimum intake of 800-1200 mg per day is essential to maintain a good bone health.

Another major age related disorders are neurodegenerative in nature such as Parkinson's disease, Alzheimer's disease and cerebrovascular disease. This occurs due to ageing and degradation of essential fats associated with neurons (basic unit of neural system). These neurodegenerative disorders can be prevented by effective supplementation of essential fats such as omega -3 fatty acids. According to WHO and American Heart Association (AHA), a minimum intake of 300-500 mg of omega-3 fatty acids is essential for proper functioning of brain and heart. Omega-3 fatty acids rich foods such as fish, can be given to old people. Further, reduction in consumption of saturated fats like vanaspati and deep oil fat fried foods could prevent the onset of neurodegenerative diseases. In addition to these disorders, cardiovascular problems often accompany ageing. The nutritional requirements as described in previous sections could be applied for geriatric people.

5.7 SUMMARY

In this unit, we have discussed the nutritive value of various food sources. Food sources contain two major class of nutrients, namely macro and micronutrients. Macronutrients like carbohydrates, proteins and fat are required for energy and structure formation while micro nutrients are essential for proper functioning of organs and metabolism. Understanding the various health benefits of common food sources are important since the information will help in designing proper diet to different age groups of people and during occurrence of any disease. A balanced diet provides complete range of nutrients essential for normal function of the body metabolism. The balanced diet varies from various age groups and genders. Foods products that do not provide any nutritional value are called empty foods and energy provided by them are called empty calories. Empty foods do not come under balanced diet. Further, cooking helps in improving the digestibility and prevents the growth of microorganisms. Further various food preservation methods discussed in this unit are commonly practised for prevention of growth of microorganisms and spoilage of foods. Improper food habits and deficiency in nutrients result in malnutrition/malnourishment leading to various health benefits. The list of important diseases caused due to deficiency in various macro and micronutrients are listed in this unit. Further special diets for managing the symptoms of type-2 diabetes, high blood cholesterol and obesity is presented. Eating whole grains, more fruits and vegetables, reduced intake of sugar and fat, avoiding alcohol and smoking ensures healthy body and prevention of nutrition related disorders.

5.8 GLOSSARY

- **Calories** :The amount of energy provided by the food we consume is measured in terms of calories
- **Carbohydrates** :Carbohydrates are made of sugars
- **Dietary reference intake:** Exact amount of intake of macronutrients and micronutrients
- **Fat** : source of energy and is also involved in the formation of cellular structures like cell membrane
- **Macronutrients:** Macronutrients are essential substances that are required at high quantity.

- **Micronutrients :** Micronutrients are essential substances that are required at very low quantity.
- **Over-nutrition :** Receiving nutrients in excess is called over-nutrition.
- **Protein-energy malnutrition :** Inadequate Carbo Hydrate and protein intake resulting in signs of malnutrition.
- **Proteins :** Protein are made up of small building blocks called amino acids
- **Recommended dietary intake :** Recommended intake of macronutrients and Micronutrients based on age, activity and condition.
- **Under-nutrition :** The condition of receiving inadequate nutrients is called undernourishment/ under-nutrition

As we have learnt "Nutrition & Balanced Diet", let us go through the activity given below.

5.9 SELF ASSESSMENT QUESTIONS

- Proteins are made of building blocks called
  a) Sugars b) Aminoacids c) Fatty acids d) Minerals
- Which of these process is used for preserving milk?
  a) Cooking b) Simmering c) Frying d) Pasteurization
- Deficiency of which of these micronutrients causes anaemia?
  a) Vitamin A b) Zinc c) Vitamin C d) Iron
- High levels of cholesterol in blood is called
  a) Diabetes b) Vitamin poisoning c) Hypercholesterolemia d) arthritis
- Which if these contain essential omega 3 fats?
  a) Fish oil b) Vanaspati c) Coconut oil d) Salty foods

5.10 SUGGESTED READING

- Davidson S. Passmore R, Brock J.F. : Human Nutrition and Dietetics, Edinburgh 1986 Churchiln livang stone.
- Swaminathan M : Essential of Foods & Nutrition, 1985 Bangalore Printing & Publishing Company Ltd, Bangalore.

5.11 REFERENCES

- Gopalan C., Rama Sastri B.V, Balasubramanian S.C.: Nutritive Value of Indian Foods. ed.2, 1989. ICMR Offset Press, New Delhi.
- Rajalakshmi, R : Applied Nutrition, 1987, Oxford/IBH

NURSING ASSISTANCE

6

HEALTH AND HYGIENE

Structure

6.0 INTRODUCTION

You must have heard the saying 'health is wealth'. Health is of prime concern for individuals as well as for the community at large. Good health requires certain efforts and cannot be purchased. In this lesson, we will discuss the characteristics of good health and the various factors that help to maintain it. Cleanliness inside and outside the house, along with proper sanitation helps in keeping the environment disease free. A set of preventive measures for good health, has become an essential part of our life Today it seems natural to wash our hands, vaccinate our children or drink safe water, but it hasn't always been so. Failure to keep up a standard of hygiene can have many implications. Not only is there an increased risk of getting an infection or illness, but also there are many social and psychological aspects that can be affected.

It is estimated that more than 3 million people per year die from water-borne or hygiene related diseases due to unsafe drinking water, unclean domestic environments, and improper excreta disposal. This chapter will focus on all aspects of hygiene and the ways in which a person should care for the personal and environmental hygiene.

6.1 OBJECTIVES

After you have studied this session, you should be able to:

- define health and hygiene
- describe the scope and principles of hygiene
- explain the components of personal hygiene
- enumerate on aspects of environmental sanitation
- define disease
- classify diseases into communicable and non communicable
- describe the types of communicable diseases
- explain the cause, mode of transmission, symptoms and preventive measures of some common communicable diseases

6.2 DEFINITION

The term health is understood differently. Usually we consider health as being free from diseases. But it is much more than just the absence of a disease. Health may enable us to do well at work and in life. Health involves proper functioning of all body organs. It also involves feeling well both in

body and in mind. People enjoying good health are cheerful, free from stress, and enjoy life to the fullest. Only if you are in good health, you will be able to help others and the community.

Health is defined as a state of complete physical, mental and social-being and not merely an absence of disease or infirmity. (WHO)

Hygiene is a Greek word "hygies" (Hygiea- Goddess of Health). Meaning "healthy, sound"

Hygiene generally refers to the set of practices associated with the preservation of health and healthy living.

Hygiene has **two elements**. Personal hygiene and Environmental hygiene.

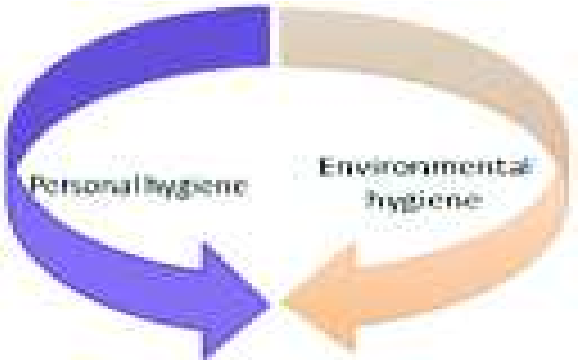

Figure 6.1 Elements of Hygiene

Personal hygiene is described as the principle of maintaining cleanliness and grooming of the external body.

Environmental Hygiene means environmental sanitation or keeping the surroundings clean.

6.3 THE SCOPE OF HYGIENE IN HEALTH

A healthy human being has generally the features like a clear skin, bright, clear eyes, a body neither too fat nor too thin, fresh breath, good appetite, sound sleep, regular activity of bladder and bowel and coordinated body movements. Therefore hygiene is linked with maintenance of our health. Hygiene is necessary to:

- Maintain good physique
- Maintain good muscle strength
- Maintain a clean mouth and teeth free from caries
- Keep eyes, ears and nose in a healthy condition and free from infection
- Maintain healthy skin

- Preserve one's energy and not get tired in carrying out daily tasks
- Maintain resistance to infection

6.4 PRINCIPLES RELEVANT TO HYGIENE

Following Hygienic principles are to be remembered in caring for people.

- The skin is the body's first line of defense against infection and injury
- Individual differences exist in the nature of the skin and its appendages
- Changes occur throughout one's life to the skin, mucous membrane, the hair, nails and the teeth
- The health of the skin and mucous membrane is highly dependent on adequate nourishment , fluid intake and exercise
- A person's general health affects both his skin, his teeth and mouth
- Hygiene practices are learned
- Hygiene practices vary with cultural norms, personal values and ability to maintain good habits of cleanliness and grooming
- External conditions affect the quality of living

6.5 CARE OF THE SKIN

Practising good personal hygiene is necessary for two reasons. First, it helps people feel good about themselves and their bodies. Second, it prevents people from contacting and spreading illness and disease. In order to preserve the cleanliness of skin and to keep healthy, regular baths and proper clothing are necessary. Daily bath keeps the skin of the face and other areas of the body clean by removing the dirt, oil, and dead cells before they can accumulate.

6.5.1 Bathing and Cleanliness

Cleanliness is next to Godliness. Everyone takes bath before any function or religious ritual. Baths help not only in cleaning but also in maintaining good circulation of blood, tone of muscles, improving appetite and giving a sense of freshness and well being. In general, bath should not be taken soon after a full meal. The best time for a bath is morning but if taken at night a warm bath is advisable. While bathing, special care must be taken to clean skin folds, such as under the chin, axilla, thighs etc. If not, these areas will give out unpleasant odors. You should be able to identify whether your patient needs warm bath or cold bath. You need to convince the patient

the need of daily bath to promote comfort. Consider their bathing practices in terms of use of soaps, lotions and temperature of water.
Kindly refer the unit VII for the bed bath procedure in module I. Next let us proceed to the clothing.

6.5.2 Clothing

Clothing is one of the essential needs of man. Clothing is required

- To protect the body from climatic factors such as extreme cold and heat
- To protect from injuries, and animal and insect bites
- To maintain the body heat
- For personal ornamentation and decoration

The materials used for clothes should be such that it will not have any harmful effect directly on the skin when worn. Children and old people are susceptible to changes in temperature and are thus liable to suffer from infection particularly of the respiratory tract. Therefore care should be taken to pay special attention in the selection of their dress.

6.6 CARE OF HANDS AND NAILS

Like your face, your hands function as bridges to the world. You shake hands when you meet or greet someone for the first time and when you seal a deal. Your hands express your affection to those you love. As hands are used to perform every work it is never free from micro organisms. Hands should be washed thoroughly with soap and water before and after any activity.

Hand Hygiene is a general term referring to any action of hand cleansing. Includes: Washing hands with the use of water and soap or a soap solution, either non-antimicrobial or antimicrobial or applying a waterless antimicrobial hand rub to the surface of the hands (e.g. alcohol-based hand rub).

Hand washing is an essential hygienic action. It involves five simple and effective steps (Wet, Lather, Scrub, Rinse, Dry). You can take to reduce the spread of diarrhoea and respiratory illness so you can stay healthy. Regular hand washing, particularly before and after certain activities, is one of the best ways to remove germs, avoid getting sick, and prevent the spread of germs to others. Hand washing does not take much time or effort, but it offers great rewards in terms of preventing illness. Nails should be cut short periodically. Otherwise dirt will be lodged under long nails which will har-

bor harmful organisms of typhoid, cholera, dysentery, diarrhoea and intestinal worms. Long nails also scratch or hurt patients especially in newborn babies and children. The habit of biting one's nails is unhygienic and should be avoided. Toe nails should also be kept short by regular trimming.

6.6.1 Steps in hand washing

Everyone must follow the below mentioned hand washing steps.

Figure 6.2 Hand Washing Steps

- Wet hands with water
- Apply enough soap and handwash to cover all hand surfaces
- Rub hands palm to palm
- Right palm over the other hand with interlaced fingers and vice versa
- Palm to palm with fingers interlaced
- Backs of fingers to opposing palms with fingers interlocked
- Rotational rubbing of left thumb clasped in right palm and vice versa
- Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa
- Rinse hands with water
- Dry thoroughly with towel. Duration of procedure: At least 15 seconds

6.7 CARE OF HAIR

Hair is a symbol of modesty and it gives an aesthetic appearance. Hair is made of dead cells. Hair is important because it brings oil to the surface of the skin. Hair helps warm the body by trapping a layer of air next to the scalp. Hence wash regularly with soap or shampoo according to the personal preference and rinse hair thoroughly with clean water after shampooing to

remove all the soap. Don't scrub or rub too hard because it may irritate your scalp or damage your hair. Massage your scalp well. It will remove dead skin cells, excess oil and dirt.

To have healthy hair, brush hair daily. Brushing helps to keep the scalp clean by loosening and removing dust and dead cells. It also adds shine. Wash combs and brushes frequently. Don't share combs, brushes. Common Hair & Scalp problems are Dandruff and Head lice.

Dandruff is the commonest problem where there is a flaking of the outer layer of dead skin cells on the scalp. This condition is usually caused by dry skin. There is no cure for dandruff, but it can be controlled with special shampoos.

Head lice are parasitic insects that live on the hair shaft and cause itching. Lice can't fly or jump from person to person, but through direct contact. For lice or pediculosis, do not share or use combs, brushes, hats, or other hair things from others .Use special shampoo and wash hair immediately. Any linen and clothes used by the infected person should be washed in hot water or dry-cleaned.

6.8 CARE OF EYES, EARS, NOSE AND MOUTH

6.8.1 Care of eyes

The eye is sometimes called the mirror of the soul which needs utmost care. While reading, books should be held 12-16 inches away from the eye at an angle of 45 to 70 degrees measured from the floor. Practicing good eye health and proper eye care are two keys to preserve your vision. Therefore

- Clean the secretions from eyes
- Cleaning should be done from inner canthus to the outer canthus of the eye
- Do not use same material to clean both eyes to prevent spread of infection
- Use protective devices while exposing to radiation
- Use protective glass during fire works
- Wear sun glasses while going out
- Treat any infection to eye and surrounding areas early.

6.8.2 Care of ear and nose

The discharges from the nose and ear are common and it should be removed frequently. Therefore

- Clean the nose and ear daily
- Should not apply pressure to remove dry materials from the nose and ear. It can be removed by wet cloth or cotton
- Should not use sharp objects to remove wax from the ear. It may tear the tympanic membrane and cause hearing impairment
- Protect the ear and nose from entry of any foreign particles

  Till now we have discussed regarding keeping our skin ,eyes ,ears and nose clean. Next let us understand how to maintain oral hygiene.

6.8.3 Mouth

After eating food, some food particles may remain sticking to your teeth. These food particles form a medium for the germs to grow, harm your gums and teeth, and cause bad breath. Brushing of teeth every day do not let the germs grow. Brushing of teeth before going to bed is a very good habit. Oral hygiene protects the teeth, gums and mucus membrane of the mouth of an individual. Therefore

- Brush teeth twice daily
- Wash dentures (artificial teeth) if any
- Gargle mouth before and after taking food
- Be careful to avoid injury to gums during brushing
- Massage the teeth and gums after brushing with fingers. It increases blood circulation
- Use good quality tooth paste and tooth brush
- Brush should reach all the surfaces of tooth while brushing
- Brushing should be done from gum to enamel
- Use emollients such as vaseline on cracked lips
- Use mouth washes help to reduce unpleasant smell from mouth
- It is essential to take well balanced diet for healthy teeth and gums

6.9 CARE OF PERINEUM

Perineal care refers to the cleanliness of external genitalia and its surroundings. Everyone must

- Take bath
- Wash the area after toileting with soap and water
- Keep the area dry always
- Females should change the sanitary pads frequently during menstruation
- Use comfortable and good cloth under garments
- Take special care, if there is any injury or abscess

Personal hygiene not only limited to bodily cleanliness, but it also includes the person's nutrition, rest and exercises.

6.10 NUTRITION

A balanced dietary intake is necessary to provide all the nutrients required by the body for its growth, regeneration and resistance against diseases. Fruits and vegetables should be washed in clean water to make them free from germs and pesticides (chemicals sprayed on plants to keep them insect free) before consumption and cooking. Water used for drinking, cooking, bathing and washing utensils should be from a clean source. Avoidance of alcohol abuse and smoking also can be considered as personal hygiene. To keep healthy, one should avoid smoking, chewing of betel nut, gutka and tobacco, and drinking alcohol. Intake of such habit-forming substances may lead to health problems such as liver damage, kidney failure and heart failure.

Cooking with care : Food should be prepared in a clean kitchen and in a clean manner. While cooking food, it is important to heat it to high temperature to kill any germs present in it. Cooked food should be eaten fresh or stored in cool, fly-proof place. Milk stored in the refrigerator or outside should be boiled again to make it germ free. Nutrition will be discussed in detail in Unit no. 4 of module I

6.11 EXERCISE AND RELAXATION

Regular walking and physical exercises have a good effect on health. Outdoor games and sports maintain the heart and circulatory system in good condition. Walking keeps the joints and bones healthy. Along with

exercises, regular sleep and relaxation also play an important part in maintaining sound mental health. They also help in the repair of body tissues.

6.12 ENVIRONMENTAL HYGIENE

You can keep your body clean but what will happen if you live in dirty surroundings? If so, you are sure to fall sick. Thus, to have a healthy living one must live in clean surroundings. Unclean surroundings may become breeding ground for flies and germs, thus, leading to spread of diseases.

6.12.1 Safe water supply

Water is a basic human need. No one can live without water. Water forms over the half of the body weight, and without a supply of water a person will die within three days. A village or community cannot survive without water supply. Water is needed for: drinking and cooking, washing the body, clothes, house and utensils, food growing and for animals, fire-fighting, industries, and for generating electricity. Water can be obtained from different sources like rain, lakes, ponds, tanks, reservoirs, streams, rivers, canals, springs and wells. A great deal of unnecessary diseases and death is caused by contamination of drinking water. Boiled cool water is suitable for drinking. We must store the water in a clean container and stored in the covered utensil. The contaminated water is an important source for spreading the water borne diseases such as jaundice, typhoid, diarrhea etc. Therefore as health worker we must educate the public on maintaining water sanitation.

6.12.2 Disposal of garbage

As we studied environmental hygiene which includes environmental sanitation or keeping the surroundings clean, to keep the environment healthy, we should be careful about the disposal of garbage. Garbage means rubbish or waste, especially domestic refuse. Some of the healthy practices for disposing the garbage are:

- Keeping the house clean: The house must be cleaned every day. We must sweep and mop the house to remove dirt from every nook and corner of the house. The furniture must also be wiped clean. The cobwebs from the walls and roof should be cleared at least once a week.
- Throwing garbage in dustbins: Do not throw your household garbage on the roadside. This makes street dirty and allows flies, mosquitoes

and other animals to breed. This garbage not only gives a dirty look but also produces foul smell. Garbage should be thrown inside the dustbins. The bins should also be cleaned after emptying the garbage.

- Keeping dustbins covered: To prevent entry of insects and other animals inside the house. Dustbins should be kept covered.
- Methods of refuse disposal are burning, burying, composting and incineration.

If we do not follow proper disposal of garbage it becomes the source of reservoir for breeding mosquitoes and rodents.

6.12.3 Disposal of excreta

Every human being excretes the waste in the form of urine and faeces. Excreta refers to human faeces . Safe disposal of excreta, means it does not contaminate the environment, water, food or hands, which is essential for ensuring a healthy environment and for protecting personal health. As already we have stressed sanitation is a critical barrier to disease transmission, plans for locating sanitation facilities, and for treating and removing waste, must consider cultural issues, particularly as sanitation is usually focused on the household. Excreta disposal may be taboo, or people may not like to discuss this issued as it is considered personal and unclean. In some cases, people may feel that sanitation facilities are not appropriate for children or that children's faeces are not harmful. In others, separate facilities may be required for men and women, and it may be necessary to locate the facilities so that no one can be seen entering the latrine building. Health improvement comes from the proper use of sanitation facilities, not simply their physical presence, and they may be abandoned if the level of service does not meet the social and cultural needs of community members at an affordable cost. We know that each house must have a sanitary latrine. Improper excreta disposal has various health hazards like soil pollution, water pollution and diseases spread by faeco oral route. Along with this, the drains should be well planned for free flow of water, and checked frequently for any blockage. Open air defecation is to be completely avoided which leads to worm infestation.

Now let us proceed to the important aspect of food and milk sanitation.

6.12.4 Food and milk sanitation

Food sanitation is more than just cleanliness. It includes all practices involved in protecting food from risk of contamination, harmful bacteria, poisons and foreign bodies. Food hygiene begins with personal hygiene, the safe handling of foods during preparation, and clean utensils, equipment, appliances, storage facilities, kitchen and dining room. Control of the microbial quality of food must focus on the preparation of food itself, food handlers, facilities and equipment. The quality of food depends on the condition when purchased, during storage, preparation and service. Food borne illnes are the greatest danger to food safety. It could result in illness or diseases to an individual that would affect their overall health, work and personal lives. One more essential fact is that we should not reuse the fried oil which can cause cancer. It is advisable to take fresh food immediately after preparation than stored food for longer days.

Same like any other food milk also needs to be handled carefully. Now a days in the market there are many brands of processed milk. Boiling and pasteurization of milk kills the microorganisms. The boiled milk should be covered and stored in a safe place. The contaminated milk can spread the illness like Tubeculosis, gastroenteritis etc.

As we have completed the discussion on environmental hygiene now I request you to go through the activity given below.

6.13 COMMUNICABLE DISEASES

A disease is defined as any deviation from health or any state when body is not at ease. Disease may be the sickness of the body or the mind. A disease can be as mild as a common cold, and stomach upset or as serious as cancer. Disease can strike almost any part of the body and anybody at some stage or the other. They can also affect a person's physical, mental and emotional health. In this section, let us study regarding the types of diseases and in detail regarding communicable diseases.

6.13.1 Types of diseases

The diseases are classified under the following types.

- **Non-communicable or non-infectious diseases :** Such diseases are not caused by any germ, therefore these diseases cannot spread from person to person. These are caused due to improper functioning of the body organs. **eg** : Diabetes, heart attack, etc.

- **Communicable or infectious diseases :** Such diseases are caused by the germs which are called pathogens. When pathogens reach healthy person, he or she is infected by a communicable disease. Diseases that are transmitted through air, water and physical contact or spread through vectors like flies and mosquitoes are termed communicable diseases. E.g.viral fever, chicken pox, malaria, cholera, etc. In continuation to this, let us now study regarding the types of communicable diseases which occur either due to contaminated air, water, food or fomites (contaminated articles)

6.13.2 Types of communicable disease

Diseases are caused due to microorganisms such as viruses, bacteria, fungi and protozoa. The disease-causing germs are called pathogens. We get such infections through air, water, food, ,cuts, sexual contact and from agents like mosquitoes, flies, rodents etc. We can classify the communicable diseases as follows.

- **Diseases caused by viruses**
  Cold, influenza, mumps, poliomyelitis, measles, rabies/hy drop hobia,jaundice/hepatitis, AIDS.
- **Diseases caused by bacteria**
  Tuberculosis(TB), diphtheria, tetanus, whooping cough (Pertussis), pneumonia, cholera, etc.
- **Diseases caused by moulds and fungi**
  Ring worm, athelete's foot, etc.
- **Diseases caused by Protozoa**
  Malaria, amoebiasis or amoebic dysentery, filariasis
- **Diseases caused by worms**
  Ascariasis, taeniasis, pinworm

6.13.3 Spread of communicable diseases

The pathogens transfer from a patient to a healthy person, generally, in the following ways:

Direct method : Diseases like measles, chicken pox and fungal infections can spread through direct contact with an infected person.

Indirect method : Touching and sharing items used by the infected person, contaminated food and drink, vectors and carriers.

6.13.4 Preventive measures for communicable diseases

The important preventive measures we need to follow are

- **Public hygiene** : Sewage and chemical wastes should not be released into the water bodies. Sewage should be chemically treated first before being released into the water bodies to avoid water-borne diseases.
- **Immunization** : Immunization and vaccination can prevent infectious diseases like typhoid, hepatitis, etc.
- **Personal hygiene :** It means take care of the skin, keep your hands and nails clean, wash your hair regularly, brush your teeth and gums after every meal, wash your eye daily with tap water, nose must be cleaned at regular intervals, never clean an ear with a sharp object, do physical exercise to keep the body muscles active, take proper rest, sleep for 6-8 hrs daily and one should develop healthy habits.
- **Healthy environment** : We must maintain a healthy environment to prevent the spreading of diseases due to the breeding of mosquitoes, house flies and micro organisms. Garbage should be kept in covered bins so that flies do not breed on them. Do not allow water to stagnate outside your house and in your neighborhood. All drains should also be covered. This will avoid breeding of mosquitoes. There should be proper sewer lines connected to sewage treatment plants.

As health personnel, we should be in a position to identify the communicable diseases and report promptly to the health department. We must know the immediate management of illness while providing home care like providing oral rehydration solution to prevent dehydration and preventing cross infection by practicing hand washing.

6.14 SUMMARY

- Health can be defined as a state of physical, mental and social well being.
- Basic conditions for good health are: balanced diet, personal hygiene, clean food, water and air, exercise and relaxation and abstaining from habit-forming substances.
- The various practices that help maintain health constitute hygiene.

- Hygiene could be personal and environmental.
- Personal hygiene includes clean habits such as: daily bath, washing of hands before eating food and going to the toilet, keeping nails, hair and teeth clean.
- Environmental hygiene includes keeping the surroundings clean and not letting germs breed and cause diseases.
- Environmental hygiene and health means keeping the house clean and not letting environment get dirty by throwing of the garbage.
- Diseases can be communicable and non-communicable.
- Communicable diseases spread from an infected person to another person through air, water, food and articles (objects).
- Communicable diseases may be caused by viruses, bacteria, fungi, protozoans, and worms (helminthes)
- Immunization by vaccines is an effective way of protecting body against communicable diseases.

6.15 GLOSSARY

Appetite: a natural desire to satisfy a bodily need, especially for food.

Appendages: a thing that is added or attached to something larger or more important

Caries: decay and crumbling of a tooth or bone.

Carrier:one who harbors disease organisms in their body without manifesting symptoms, thus acting as a distributor of infection

Composting : nature's way of recycling and is the biological process of breaking up of organic waste such as food waste, manure, leaves, grass trimmings, paper, worms, and coffee grounds, etc., into an extremely useful humus-like substance by various micro-organisms including bacteria and fungi in the presence of oxygen.

Garbage : rubbish or waste, especially domestic refuse.

Grooming : The process of making yourself tidy and clean

Immunization: The process of inducing immunity, usually through inoculation or vaccination.

Incineration: Waste destruction in a furnace by controlled burning at high temperatures.

Infection : The invasion and multiplication of microorganisms such as bacteria, viruses, and parasites that is not normally present within the body.

Vaccine: an antigenic substance prepared from the causative agent of a disease or a synthetic substitute, used to provide immunity against one or several diseases.

Vector: living organisms that transmit diseases

6.16 SELF ASSESSMENT QUESTIONS

Fill in the Blacks :

1. Define health.
2. Oral hygiene protects the———, —— and — of an individual.
3. Intake of alcohol and narcotics may cause damage to _____and____
4. Washing of fruits and vegetables makes them free from ____ and____
5. The best method to prevent spread of infection is ————
6. Unclean surroundings become breeding ground for ____ and ____
7. Water forms ————of the body weight
8. The house should have ———— ventilation
9. Garbage should be thrown inside the————
10. Environmental hygiene includes ————

1. List any two diseases transmitted from an infected person to other healthy person.
2. Are hypertension and diabetes examples of communicable or non-communicable diseases?
3. Name any two diseases that can be prevented by taking vaccines.
4. Name the body organ(s) affected by hepatitis (jaundice).

6.17 SUGGESTED READING

- Park k : Text book of preventive and social medicine ed - 22 Jabhalapur 2014 Banarsidas Bhanot .

6.18 REFERENCES

- Sundar Rao. K : An introduction to Community Health Nursing. ed-3 Chennai, 2000, B I Publishers .
- Potter A P, Perry A G.F : undamentals of nursing. ed-6 Missoriu: 2005, Mosby publication.

NURSING ASSISTANCE

7

INFECTION CONTROL

Structure

7.0 INTRODUCTION

Minute "living things" that are usually too small to be seen with our naked eyes are called as "Microorganisms". These include Bacteria, Fungus Protozoa, Algae, Virus, and can be categorized into two groups namely Prokaryotes and Eukaryotes. Prokaryotes are single celled organisms which lack nucleus. Eukaryotes are the organisms which contain nucleus. The microorganisms not only live in humans and animals, they are ubiquitous in nature Some of these microorganisms are needed to maintain good health and used to produce food and chemicals while some of these microorganisms cause "DISEASE".

The infections are also caused by parasites. Parasites are the organisms that live in or on another organism. The main organisms causing parasitic diseases are protozoa and helminths. Protozoa are unicellular microorganism. Malaria is an example of the disease caused by a proto zoan parasite, Plasmodium. Helminths are large multicellular organisms commonly known as **parasitic worms** and when mature, can be seen with the naked eye. These include **flatworms**, **tapeworms, ringworms**, and **roundworms**.

These disease causing microorganisms are called "PATHOGENS". All of us have defense systems in our body to keep ourselves healthy. , However under certain conditions, we may become susceptible to pathogens. When these pathogens colonize in our body, they cause "INFECTION", leading to disease. Understanding the concepts of infection and mode of its control is an important concern to mankind, as uncontrolled infections can take a toll on human life. Keeping this view in mind let us understand the concepts in this **Unit VI** entitled **"INFECTION CONTROL".**

7.1 OBJECTIVES

After reading this lesson you should be able to :

- Define pathogen and infection
- Explain contamination and types of contamination
- Elaborate on properties and characteristics, mechanism of action of antiseptics and disinfectants

- Discuss fundamentals of sterilization and methods of sterilization.
- Elaborate on Biological waste and its management

7.2 PATHOGEN AND INFECTION

Microbes are as old as life itself and their influence on man are also equally old. When pathogens enter our body they can multiply and colonize and can cause "Infection" leading to disease. For an infection to occur, a certain sequence of events must take place. This sequence of events is often referred to as the chain of infection. This chain is made up of sections that link together to form the infectious process. The chain must include: Pathogen, Mode of Transmission, Route of Exposure, and Susceptible Host (such as the human body).

7.2.1 Pathogen: A pathogen is an organism that causes a disease. Pathogen include *Bacteria, Viruses, Fungi, Protozoa and Parasites*.

7.2.2 Modes of transmission: The modes in which the pathogens are transmitted are either direct or indirect contact. Direct transmission occurs when a pathogen is transmitted directly from an infected individual to another individual. Indirect transmission occurs when an inanimate object serves as a temporary reservoir for a pathogen. Pathogens can enter the body through four primary routes: inhalation, contact with infected blood or other body fluids, Ingestion, eg. through drinking water contaminated with sewage and an intermediate carrier (such as a tick).

7.2.3 Types of pathogen : The types of pathogens are as follows

- **Bacteria :** Bacteria are very simple prokaryotic single-celled organisms lacking a nucleus. They contain a small amount of loosely-coiled DNA as the genetic material. They are usually no bigger than 10 micrometres (millionths of a metre) in length.

- **Fungi :** Mushrooms, bread mould are all types of fungi. Fungi are eukaryotic microorganisms with each fungal cell having a nucleus & a cell wall .Yeast is a type of single celled fungus which is used to prepare bread and beer. They can also cause disease. They are around 2 -10 microns in diameter and upto several centimetres in length.

- **Viruses :** Are prokaryotic microorganisms and are very tiny and much smaller than bacteria or fungi. They measure only a few thousand millionths of a metre (nanometres).
- **Protozoa :** Are large, single-celled organisms. They are usually from a few microns to several hundred microns in length. Protozoa cause a number of human diseases, best known being malaria, certain forms of dysentery and sleeping sickness.
- **Parasites:** Protozoa and helminths are the common parasites. The modes of spread of parasites are similar to the modes of spread of other pathogens. However, other important modes of parasite spread are food that has been mishandled or undercooked and an insect that acts as a vector, or carrier, and transmits it while feeding on the host. For example, malaria causing protozoa, Plasmodium, is spread by mosquitos.

7.2.4 How Pathogens Spread

There are lots of different ways in which pathogens can be spread to cause disease.

Table 1 : Modes of spread of pathogen with their source and example

Mode of spread	Source	Example of disease
Droplet infection (through the nose)	When an infected person coughs, sneezes or talks, tiny droplets fly out of your mouth and nose containing microbes, other people get infected when they breathe in the droplets	Tuberculosis ,common cold & flu.
Direct contact (eg reproductive organs)	Direct contact of the skin	Genital herpes, Athlete foot
Contaminated food (through the mouth)	Eating raw or undercooked food, or drinking water contaminated by sewage allows intake of large numbers of microorganisms straight into your gut	Cholera (contaminated water), *Salmonella* (contaminated food)
Contaminated water (through the mouth)	Drinking water contaminated by sewage	Cholera and amoebic desentery
By body fluids (through breaks in the skin)	Blood and semen and through fresh, bleeding cuts and scratches as well as through needle punctures	HIV/AIDS, Hepatitis
Vectors (usually through the skin or through the mouth)	Animal which spreads disease-causing organisms from one host to another	Mosquitoes (malaria) and houseflies (dysentery).

7.2.5 Infection

Infection can be defined as entry of a harmful organism (Bacteria, Fungi, Viruses, Protozoa & Parasite) into the body and its multiplication in the tissues / bloodstream.

Pathogen —*Transfer to*→ Host (human being —*Multiplies*→ Injury to host —*Causing*→ **DISEASE**

Pathogenesis

Fig.1. Pattern of Disease

7.3 CONTAMINATION

The entry of undesirable organisms into some material or object. Food, water or air can become unsafe through contamination with pathogens. Pathogens can get into the body through contaminated food, water & air.

7.3.1 Sources of Contamination

Besides particular matter such as dust, the most common sources of contamination are:

- **People :** Hair, fibre particles from bodies and clothes, poor hygiene
- **Environment *:*** Contaminated air, work surfaces, gases, ceilings, walls and floors
- **Materials** : Packaging material, fibres, dust.
- **Buildings *:*** Paint flaking, rusty pipe work, poorly maintained surfaces.
- **Water *:*** Water coming in contact with sewage.

7.3.2 Microbiological Contamination

The unwanted or accidental introduction of infectious material, like bacteria, yeast, mould, fungi, virus, protozoa or their toxins and by-products is known as microbial contamination. Contamination may occur if pathogens are carried unknowingly from source to oral cavity or an artificial body opening of the host where they start growing and expressing their effect. There are several possible sources, entry routes and ways for transmission.

- **Sources** : Natural body orifices or artificial openings due to injury or disease
- **Direct transmission :** via contact or droplet spread.
- **Indirect transmission** : via surfaces or instruments, vectors such as mosquitoes, flies, rats & intermediate host such as human, animal or

insect, e.g., transmission of malaria through mosquitoes. Or in a health care setting, usual ways of contamination are hands of health care personnel and via droplets in the air.

7.4. CONTROL OF MICROORGANISMS

The term 'control of microorganisms' refers to reduction in numbers and/or activity of microorganisms. There are several methods that are used to control microorganisms. Microorganisms can be removed by various physical agents, physical processes or chemical agents. Process that destroys all forms of microorganisms is called Sterilization. Important methods of control are discussed as follows.

7.4.1 Physical methods

The major physical methods/processes used for control of microorganisms are temperature (high and low, desiccation, osmotic pressure, radiation and filtration). Some important physical methods are discussed below.

7.4.1.1 High temperature : is considered to be most reliable method of controlling the microorganisms. The heat is employed as Dry heat & Moist Heat. Control of microorganisms by dry heat can be achieved by

- **Incineration :** This is a method of destroying microorganisms by burning. This is used for destruction of contaminated material such as soiled dressings; animal carcasses, pathological material and bedding etc. to be disposed off.
- **Hot air sterilization:** Articles such as glass ware, surgical instruments to be sterilized are exposed to high temperature (160°C) for duration of two hours in an electrical/gas oven. This method is used to make the medical devices safe by making them free from all microorganisms. Control of microorganisms by **moist heat** can be achieved by
- **Boiling water :** Boiling water kills most vegetative bacteria and viruses immediately. However, the contaminated materials or object cannot be sterilized fully by boiling water as some bacterial spores can withstand this condition. Exposure of instruments for short period of times in boiling water is used for disinfection by destroying vegetative cells of pathogens (rather than sterilisation).

- **Steam under pressure :** Heat in the form of saturated steam under pressure is the most practical and dependable agent for sterilization as it provides the temperatures above the boiling point. An autoclave is generally used for sterilization of materials by steam under pressure. An autoclave is generally operated at a pressure of approximately 15 lbs/in^2 (where the steam temperature is at 121°C). The time of operation to achieve sterilization depends on the nature of the material and can vary from 10-15 minutes to 1 hour or more.
- **Pasteurisation** is the process of heating a liquid food or beverages to a controlled temperature to enhance keeping quality and destroy harmful microorganisms. Milk, cream and certain alcoholic beverages (beer and wine) are generally subjected to pasteurization.

7.4.1.2 RADIATION : Energy transmitted through space in variety of forms is generally called radiation. From the sterilization point of view, electromagnetic radiation e.g., light and x-rays are important. X-rays and gamma rays are ionizing radiations as they have high energies and ionize the molecules of materials. There have been many developments in the application of ionizing radiation to sterilize biological materials. This method is called cold sterilization as ionization radiation produces relatively little heat in the material being irradiated. Therefore, it is possible to sterilize heat sensitive substances.

Less energetic radiation, particularly ultraviolet (UV) light, does not ionize the molecules and has very little ability to penetrate matter. Even a thin layer of glass filters off a large percentage of the light. Thus only the microorganisms on the surface of an object exposed directly to the ultraviolet light are destroyed. Germicidal lamps that emit a high concentration of UV light in the most effective region of 2600 to 2700 Angstroms are widely used to reduce microbial population. These lamps are widely used in hospital operating rooms, in aseptic filling rooms, in the pharmaceutical industry and in the food and dairy industries for treatment of contaminated surfaces.

7.4.1.3 FILTRATION : does not kill microbes, it separates them out. It is used to remove microbes from heat labile liquids such as serum, antibiotic solutions, sugar solutions, urea solution. Membrane filters with pore sizes between 0.2-0.45 ìm are commonly used to remove particles from solutions that can't be autoclaved.

Air filters are best example of filtration, which are used in biological safety cabinets in laboratories Air can be filtered using HEPA (High Efficiency Particle Air) filters. HEPA filters are at least 99.97% efficient for removing particles >0.3 ìm in diameter.

7.4.2 Chemical methods

Antiseptics and disinfectants are the chemical agents that destroy pathogen and are discussed below.

7.4.2.1 Antiseptics and disinfectants : Antiseptic is a substance that opposes sepsis, i.e., prevents the growth and action of microorganisms either by destroying them or by inhibiting their growth and metabolism. Antiseptics are usually applied to the body. Antiseptics can also be used to disinfect the inanimate objects like instruments, surfaces etc.

Disinfectants are usually a chemical agent that kill the growing forms or microorganisms but not necessarily the resistant spore forms of pathogens. Disinfectants are commonly applied on inanimate (nonliving) objects to destroy the infectious microorganisms.

7.4.2.2 Characteristics of Antiseptics and Disinfectants

For any chemical agent to be regarded as an “Antiseptic” or an “Disinfectant”, it should have the following characteristics.

Table 2 : Characteristics of Antiseptic and Disinfectant

An antiseptic should be	A disinfectant should be
1. Rapid in action and lethal (cause death of microorganisms)	1. Non-corrosive
2. Non-irritating to tissues when applied.	2. Good penetrating agent
3. Non-allergic to the subject.	3. Compatible with other organic compounds like soap.
4. No systemic toxicity (Non-absorbable).	
5. Active even in the presence of body fluids e.g. blood, pus.	

7.4.2.3 Mechanism of action of antiseptic and disinfectant : The mechanism of action of antiseptic and disinfectants involve damaging the cell wall or inhibition of the synthesis of cell wall, alteration in the permeability of cytoplasmic membrane and physical or chemical properties of proteins and nucleic acids (DNA and RNA). They also inhibit the synthesis of protein and nucleic acid and action of various enzymes.

7.4.2.4 Commonly used antiseptics and disinfectants : After understanding the definition, characteristics & mechanisms of action of antiseptics & disinfectants, let us now list out some commonly used antiseptics & disinfectants we come across in day to day life

Table 3 : Commonly used antiseptic and disinfectant

Commonly used antiseptics		
Name of the antiseptic	**Where it is used**	**How it works**
Alcohols	Spirits ,Tincture	Cleanses the skin before injections are given.
Anilides	Soaps, Deodorants.	It kills the microorganisms by damaging the cell wall
Chlorhexidine	Hand wash, Mouth wash.	It damages the inner membrane of the micro-organism
Diamidines	On wounds	It removes bacteria
Nitrofuran	Creams, dusting powder or solutions in the treatment of burns and skin grafts, minor cuts, and wounds.	It effects the enzymatic activity of the cell
Commonly used disinfectants		
Name of the Disinfectant	**Where it is used**	**How it works**
Isopropanol	Applied on Skin and surgical instruments.	It removes all the micro-organisms
Glutaraldehyde	Used on endoscopes and surgical equipment	It effects all the Bacteria, Fungi &Viruses
Chlorine	Used in drinking water	It disinfects all microorganisms
Basic Fuschin	Applied on the skin	It reduces Ring worm infections

7.5 BIOLOGICAL WASTE MANAGEMENT

In many countries, knowledge about the potential for harm from health-care wastes has now become more important to individuals, governments, medical practitioners and common people. And each one of us should take more responsibility for the waste produced from medical care and related activities. All wastes that contain infectious material or which may be harmful to humans, animals, plants or the environment are bio-hazardous wastes. These include: waste from infectious animals; bulk human blood or blood products infectious microbiological waste (including contaminated disposable culture dishes and disposable devices used to transfer, inoculate and mix cultures) pathological waste; sharps; and hazardous products. They are treated by thermal or chemical disinfection or by incineration. All animal carcasses (except those contaminated with radioactive material which must be disposed off differently) and recognizable body parts must be incinerated or sent to a commercial rendering plant. All infectious material should be disinfected before removal from the laboratory. With exception of sharps, glassware and plastics, all infectious material should be incinerated (even after disinfection). Sharps must be segregated from other waste and placed in puncture resistant containers. All metallic sharps, regardless of their use, are considered bio-hazardous and must be encapsulated prior to disposal. Liquid waste should be disinfected and discharged into the sewer system. Treatment of all laboratory biological waste before disposal is good laboratory practice, and is highly recommended. Bio-hazardous waste must be treated and properly labeled and records must be maintained. Persons who may come in contact with bio hazardous material must be appropriately trained.

The irregular handling and disposal of waste within health-care facilities is now widely recognized as a source of avoidable infection, and is the same with public awareness of poor standards of health care. Hence to manage the biological waste, the seven step process should be followed very strictly.

7.5.1 Seven Step Process in Biological Waste Management

The key requirements for disposal of bio-hazardous waste

1. **Responsibility :** Any person who work with the Biological waste management system shall be the keen observer of all the requirements within his/her laboratory.
2. **Segregation from other waste :** Materials like sharp must be segregated from other waste , solid waste should be burnt or incinerated and it should not be mixed with glass or plastics ,chemical waste and hazardous materials should be never mixed with biological waste.
3. **Treatment to eliminate the biological hazard :** Several methods such as incineration, chemical disinfection, thermal disinfection must be followed prior to disposal.
4. **Specific labels to indicate the method of treatment:** Containers holding bio-hazardous material must be clearly labelled, which should include the Biohazard Symbol. Biological waste may be held temporarily under refrigeration (warning signs must be posted).
5. **Secure packaging :** Containers must be appropriate for the contents, not leaking, properly labelled and their integrity maintained if chemical or thermal treatment is used. Containers of bio-hazardous material should be kept closed.
6. **Transport to, and place in the dumpster by appropriately trained personnel**
7. **Document action by maintenance of appropriate record:** Properly trained laboratory personnel shall be responsible for transporting treated biological waste from the generation site to the dumping place. The documentation and the maintenance of the record should be carefully and regularly done.

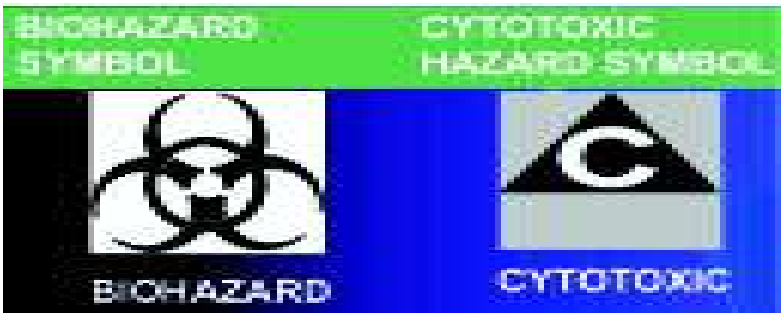

Fig 2 : Biohazardous symbol

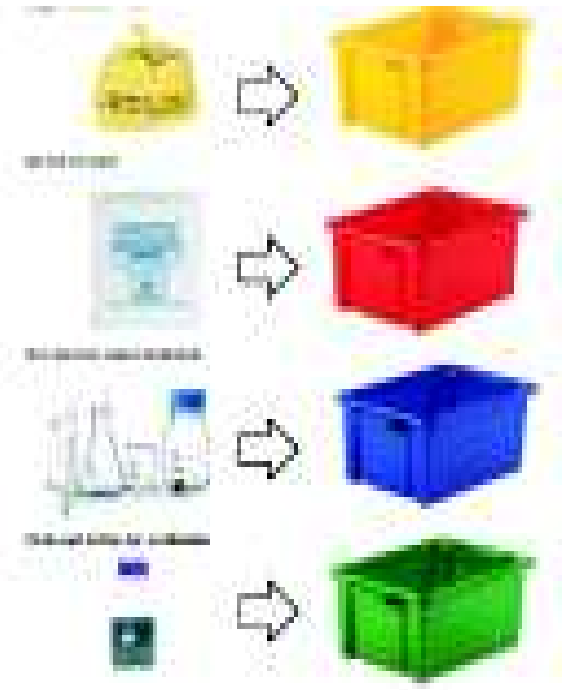

Fig 3: Biological waste disposable bags

7.6 SUMMARY

Infection remains the main cause of morbidity and mortality in man. Most infectious agents are microorganisms. These exist naturally everywhere in the environment, and not all cause infection (e.g. 'good' bacteria present in the body's normal flora). Several classes of microorganisms including bacteria, viruses, fungi, and parasites evolve as pathogens. Now it is very important to control microbial growth in surgical and hospital settings, industrial and food preparation facilities as well on our own body. There are various physical and chemical methods to control the microorganisms. Physical methods of control include dry heat, moist heat, pasteurization, incineration and radiation. Antiseptic and disinfectants are examples of chemical methods of control. Antiseptics include chemical agents like iodine and alcohol which reduce pathogenic microorganisms and are generally applied to the body. *Disinfectants* like phenols, alcohols, aldehydes, are chemical agents generally used on inanimate objects. In pursuing the aims of reducing health problems and eliminating potential risks to people's health, health-care services unavoidably create waste that may itself be hazardous to health. The waste produced in the course of health-care activities carries a higher potential for infection and injury than any other type of

waste. Wherever waste is generated, safe and reliable methods for its handling are very essential. Inadequate and inappropriate handling of health-care waste may have serious public health consequences and a significant impact on the environment. Sound management of health-care waste is thus a crucial component of environmental health protection.

7.7 GLOSSARY

- **Microbial Population :** Collection of microorganisms.
- **Susceptible Host :** A person / patient who is prone to fall sick
- **Toxins :** a poison produced by or derived from microorganisms.
- **Bioburden :** number of bacteria living on a surface that has not been sterilized.
- **Dumpster :** large steel waste container for garbage

7.8 SELF ASSESSMENT QUESTIONS

- Droplet Infection is spread through
  a. Blood b. Nose
- Contamination makes us
  a. Healthy b. Sick
- To achieve_____there must be intimate and adequate contact between the sterilizing agent and the device used.
  a. Sterilization b. Dry Heat sterilization.
- All infectious material should be_____ before removal from the laboratory
  a. Disinfected b. Washed
- To manage the biological waste the._____ should be followed very strictly.
  a. Seven step process b. Five step Process

7.9 SUGGESTED READINGS

- Microbial contamination www.safeinfusiontherapy.com
- Safe management of wastes from Health-care Activities by World Health organization, 2nd edition.
- Management and Disposal of Biological Waste TAMIU Rev 4/99.

- Module Microbiology: Sterilization & Disinfection Chapter 4.
- Sterilization & Disinfection (www.microrao.com)
- United Nations Environment Programme International Source Book on Environmentally Sound Technologies (ESTs) for Municipal Solid Waste Management (MSWM)<http://www.unep.or.jp/ietc/ESTdir/Pub/MSW/index.asp

7.10 REFERENCES

- Prescott etal L.M : Microbiology ed. 6 International Student Edition
- Tortora etal. : Microbiology - An Introduction ed.9 Mc Graw Hill Education.
- Pelczar Jr, Chan M.J., ECS Krieg, N.R. Microbiology ed.5 International Student Edition, 1986 New yark.
- Sundararajan S : College Microbiology
- www.abpisschools.org.uk.in
- www.defra.gov.uk
- Pirofski Casadevall : Q&A: What is a pathogen? A question that begs the point,BMC Biology 2012, 10:6
- http://www.biomedcentral.com/1741-7007/10/6 .
- Block S S : Disinfection, sterilization, and preservation. 1991 Lea & Febiger.

NURSING ASSISTANCE

8

BASIC NURSING PROCEDURE

Structure

8.0 INTRODUCTION

Nursing is a core part in health service delivery system in which health promotion, disease prevention, curative and rehabilitative health strategies are applied. The clinical nursing skills for the nurses are of paramount importance not only to provide comprehensive care but also to enhance clinical competence. It is well known that no nursing service can be provided without basic nursing skills. For the nurses to provide health service at different settings; hospital, health centre, clinics and at the community level including home based care for chronically sick patients, this course is very essential.. This Procedure manual is therefore organized in a logical manner that nursing assistance can learn from simpler to the complex and provide the basic care to the needy clients. The procedures may vary from hospital to home setting.

8.1 OBJECTIVES

After reading the unit on basic nursing procedures, the students should be able to

- define nursing procedures viz bed making, vital signs ,oral hygiene, bed bath, catheter, care, nail care, transferring clients, assisting in feeding, administration of medications, cleaning and wound dressing.
- list the purposes of the procedures.
- list the equipment needed for each procedure
- apply the steps while doing different procedures
- Document the procedures carried out

8.2 BED MAKING

It is the technique of preparing different types of bed for patients / clients in a hospital or people at home to make them comfortable.

8.2.1 Common types of bed

A-Occupied Bed is made when the patient or a person is not able or not permitted to get out of the bed.

B-Unoccupied Bed is made when there is no patient confined in bed, while a patient is in the shower or sitting up in a chair.

Types of unoccupied bed :

1- Open bed: The top covers are folded back so the patient can easily get back in to bed.

2- Closed bed: the top sheet, blankets and bedspreads are drawn up to the head of the mattress and under the pillow. This is prepared in a hospital room before a new client is admitted to the room.

3- Post-operative bed: Known as recovery bed or anesthetic bed, and used for a patient with large cast or other circumstance that would make it difficult for him to transfer easily into the bed.

8.2.2 Un-occupied bed

The main purpose of the unoccupied bed is the following

- To provide clean and comfortable bed for the patient.
- To reduce the risk of infection by maintaining a clean environment.

Equipments required for un-occupied bed

1. Mattress and mattress cover
2. Two bed sheets - one bottom sheet, one top sheet,
3. Pillow - 1 or 2 pillow covers
4. One mackintosh
5. One draw sheet
6. One blanket and water in basin, two dusters one to wipe with water, one to dry, one kidney tray or paper bag one laundry bag or bucket, trolley (in the hospital setting)

While doing the unoccupied bed you have to follow the below mentioned steps

- Explain the purpose and procedure to the client.
- Perform hand washing.
- Prepare all required equipments and bring the articles to the bedside
- Clean the mattress

While cleaning the mattress you have to follow these steps

- Stand on the right side
- Start wet wiping from top to centre and from centre to bottom on the right side of mattress
- Gather the dust and debris to the bottom
- Collect them into the kidney tray
- Give dry wiping as same as step 2.
- Move to the left side.

- Wipe with wet and dry duster on the left side
- Move to the right side

The procedure for spreading the bottom sheet are as follows:

- Place and slide the bottom sheet upward over the top of the bed leaving the bottom edge of the sheet.
- Open it lengthwise with the centre fold along the bed centre.
- Fold back the upper layer of the sheet toward the opposite side of the bed.
- Tuck the bottom sheet securely under the head of the mattress (approximately 20-30cm). Make a mitered corner by the following steps:

1. Pick up the selvage edge with your hand nearest the hand of the bed.
2. Lay a triangle over the side of the bed.
3. Tuck the hanging part of the sheet under the mattress.
4. Drop the triangle over the side of the bed**.**
5. Tuck the sheet under the entire side of bed.

- Repeat the same procedure at the lower end of the bed
- Tuck the remainder in along the side of the bed.

Mackintosh and draw sheet : Steps to be followed for Mackintosh and draw sheet are:

1. Place a mackintosh at the middle of the bed (if used), folded half, with the fold in the centre of the bed.
2. Lift the right half and spread it forward the near side.
3. Tuck the mackintosh under the mattress.
4. Place the draw sheet on the mackintosh. Spread and tuck the mackintosh.
5. Move to the left side of the bed and follow the same procedure for bottom sheet, mackintosh and draw sheet.
6. Return to the right side.

Top sheet and blanket: 1. Place the top sheet evenly on the bed, centering it in the below 20-30 cm from the top of the mattress.
2. Spread it downward.
3. Cover the top sheet with blanket below 1foot from the top of the mattress and spread it downward.
4. Fold the cuff (approximately 1 foot) in the neck part.
5. Tuck all these together under the bottom of mattress .Miter the corner.
6. Tuck the remainder in along the side of the bed.

7. Repeat the same as in the above procedure in the left side.
8. Return to the right side.

- **Pillow and pillow cover :** 1) Put a clean pillow cover on the pillow.

2) Place a pillow at the top of the bed in the centre with the open end away from the door.

3) Replace all equipments in proper place. Discard linen appropriately.

4) Perform hand washing.

8.2.3 Occupied bed

Purpose of the occupied bed

1. To provide clean and comfortable bed for the patient
2. To reduce the risk of infection by maintaining a clean environment
3. To prevent the bed sores by ensuring there are no wrinkles to cause pressure points

Equipment required for the procedure are

1. Bed sheets-2: Bottom sheet (or bed cover) -1 Top sheet-1
2. Draw sheet -1
3. Mackintosh -1(if contaminated or needed to change)
4. Blanket -1 (if contaminated or needed to change)
5. Pillow cover -1
6. Water in a basin
7. Duster - 2: to wipe with solution -1and to dry-1 .
8. Kidney tray or paper bag -1
9. Laundry bag or bucket -1
10. Trolley (in hospital setting)

While doing the Occupied bed, you have to follow the below mentioned steps

1. Prepare all required equipments and bring the articles to the bedside.
2. Close the curtain or door to the room. Put screen.
3. Remove the client's personal belongings from bed-side and put them into the bed- side locker or safe place .
4. Lift the client's head and move pillow from centre to the left side.
5. Assist the client to turn toward left side of the bed. Adjust the pillow. Leave top sheet in place.
6. Stand on the right side of the bed: Loose bottom bed linen. Fanfold (or roll) soiled linen from the side of the bed and wedge them close to the client

7. Wipe the surface of mattress by with wet and dry duster.
8. Bottom sheet, mackintosh and draw sheet

While changing the bottom sheet, mackintosh and draw sheet, you must follow these steps

- Place the clean bottom sheet evenly on the bed folded lengthwise with the centre fold as close to the client's back as possible
- Adjust and tuck the sheet tightly under the head of the mattress, making mitered the upper corner
- Tighten the sheet under the end of the mattress and make mitered the lower corner
- Tuck in alongside
- Place the mackintosh and the draw sheet on the bottom sheet and tuck in them together

9. Assist the client to roll over the folded (rolled) linen to right side of the bed. Readjust the pillow and top sheet
10. Move to left side. Discard the soiled linen appropriately. Hold them away from your uniform. Place them in the laundry bag (or bucket)
11. Wipe the surface of the mattress with wet and dry duster
12. Bottom sheet, mackintosh and draw sheet

- Grasp clean linen and gently pull them out from under the client
- Spread them over the bed's unmade side. Pull the linen taut
- Tuck the bottom sheet tightly under the head of the mattress and miter the corner
- Tighten the sheet under the end of the mattress and make mitered the lower corner
- Tuck in alongside
- Tuck the mackintosh and the draw sheet under the mattress

13. Assist the client back to the centre of the bed. Adjust the pillow
14. Return to right side. Clean top sheet, blanket

- Place the clean top sheet at the top side of the soiled top sheet
- Ask the client to hold the upper edge of the clean top sheet
- Hold both the top of the soiled sheet and the end of the clean sheet with right hand and withdraw to downward. Remove the soiled top sheet and put it into a laundry bag (or a bucket).
- Place the blanket over the top sheet. Fold top sheet back over the blanket over the client.
- Tuck the lower ends securely under the mattress. Miter corners

- After finishing the right side, repeat the left side

15. Remove the pillow and replace the pillow cover with clean one and reposition the pillow to the bed under the client's head
16. Replace personal belongings back. Return the bed-side locker and the bed as usual
17. Return all equipment to proper place
18. Discard linen appropriately. Perform hand washing.

8.3 VITAL SIGNS

Vital signs are clinical measurements, specifically pulse rate, temperature, respiration rate, and blood pressure that indicates the state of a patient's essential body functions.

There are four primary vital signs. They are

- Body temperature
- Pulse (heart rate)
- Breathing rate (respiratory rate)
- Blood pressure,

8.3.1 Body temperature

Body temperature may be defined as the degree of heat maintained by the body. Normal body temperature can range from 97.8 degrees F (or Fahrenheit, equivalent to 36.5 degrees C, or Celsius) to 99 degrees F (37.2 degrees C) for a healthy adult.

A person's body temperature can be taken in any of the following ways :

Orally : Temperature can be taken by mouth using either the classic glass thermometer or the more modern digital thermometer that use an

Figure 8.1 Oral Temperature

electronic probe to measure body temperature.

Temperatures taken rectally (using a glass or digital thermometer) tend

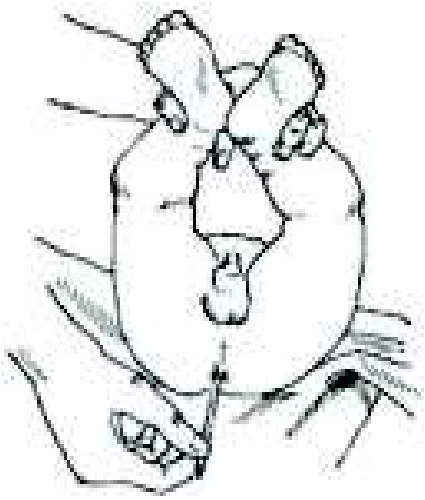

Figure 8.2 Rectal temperature

to be 0.5 to 0.7 degrees F higher than when taken by mouth.

***Axilla* :** Temperatures can be taken under the arm using a glass or digital thermometer. Temperatures taken by this route tend to be 0.3 to 0.4 degrees

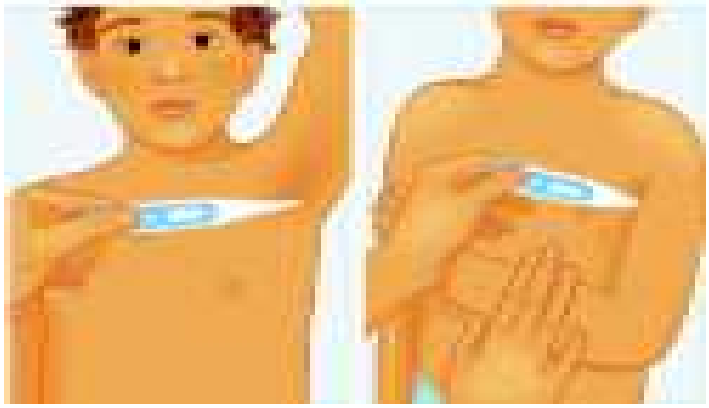

Figure 8.3 Axillary Teperature

F lower than those temperatures taken by mouth

Ear : A special thermometer can quickly measure the temperature of the ear

Figure 8.4 Temperature by ear

drum, which reflects the body's core temperature (the temperature of the internal organs).

Figure 8.5 Temperature by skin

Skin : A special thermometer can quickly measure the temperature of the skin on the forehead.

Body temperature may be abnormal due to fever **(**high temperature) or hypothermia (low temperature). A fever is indicated when the body temperature rises about one degree or more over the normal temperature of 98.6 degrees Fahrenheit. Hypothermia is defined as a drop in the body temperature below 95 degrees Fahrenheit.

Assessing the body temperature : For assessing body temperature, the equipment needed are the following

- Clinical thermometer
- Wet swabs in bowl and dry swabs in another bowl
- Kidney tray , paper bag
- Watch which shows the seconds
- Patients towel to wipe the axilla or groin

The procedures for checking the temperature are as follows :

- Wash hands
- Collect the equipments and bring to the patients.
- Explain the procedure to the patient.
- Ask the patient if any hot or cold food items was taken by mouth (in case of oral temperature). If taken wait for 15-30 minutes
- Take the thermometer and wipe it with cotton swab from bulb towards the tube.
- Shake the thermometer with strong wrist movements until the mercury line falls to at least 95 ^{0}F(35 ^{0}C)
- Place the thermometer bulb under the tongue of the patient
- Instruct the patient to hold the thermometer by lips not to touch or bite with teeth .Leave the thermometer in place for 2 minutes.

- Remove the thermometer and read the temperature at eye level
- Clean the thermometer using the wet swab from stem to bulb and place the thermometer in the container
- Record the temperature
- Clean the articles and replace them.
- Wash hands.

Note : For taking axillary temperature follow the same procedure except for the following steps, ie after cleaning and drying the thermometer, wipe the axilla and place the thermometer in the axilla for 3minutes. The thermometer to be held properly in the axilla. Keep the arm flexed across the chest, close to the side of the body

8.3.2 Pulse

Pulse is the expansion and contraction of an artery felt where the artery is near the surface(skin)and passes over a bone. Average pulse in one minute ranges from 70-80. Place of taking pulse are, wrist and elbow.

Figure 8.6 Taking Pulse at Wrist and Elbow

Equipments needed are same as temperature

Procedure

1. Keep the patient's arm on the chest
2. Feel the pulse by placing the forefinger and middle finger on the thumb side area of the wrist.
3. Count the beats for one minute
4. Remove the article and record the procedure
5. Wash hands

8.3.3 Respiration

It is an act of breathing. It consists of inspiration (breathing in air) and expiration (breathing out air). Normal range is 16-18/minute.

Taking and counting respiration

Equipments needed are as same as temperature checking.

1. Keep the patients hand on chest or abdomen or straight on bed
2. Keep your hand on the artery over the wrist as you are counting the pulse to make the patient at ease.
3. Without the knowledge of the patient, count the breathing or chest movement up and down for a minute
4. Remove the article and record the procedure
5. Wash hands

8.3.4 Blood pressure

It is the pressure exerted by circulating blood upon the walls of blood vessels and is one of the principal vital signs. A person's blood pressure is usually expressed in terms of the systolic (maximum) pressure over diastolic (minimum) pressure and is measured in millimeters of mercury (mm Hg). Normal resting blood pressure for an adult is approximately 120/80 mm Hg.

The purposes of checking blood pressure are

1. To obtain baseline data for diagnosis and treatment
2. To compare with subsequent changes that may occur during care of patient
3. To assist in evaluating the status of patient's blood volume, cardiac output and vascular system
4. To evaluate patient's response to changes in physical condition as a result of treatment with fluids or medications

Equipment required are : Sphygmomanometer (mercury)or digital manometer. It consists of cuff and manometer and Stethoscope

While checking blood pressure, you must follow the steps mentioned below.

1. Wash your hands.
2. Gather all equipment. Cleanse the stethoscope's ear pieces and diaphragm with a spirit swab wipe
3. Explain the purpose and procedure to the client.
4. Have the client rest at least 5 minutes before measurement.
5. Identify factors likely to interfere which accuracy of blood pressure measurement like exercise, coffee and smoking.
6. Setting the position

- Assist the client to a comfortable position. Be sure room is warm, quiet and relaxing.
- Support the selected arm. Turn the palm upward.
- Remove any constrictive clothing

7. Check brachial artery and wrap the cuff

- Palpate the brachial pulse at the inner part of the elbow.
- Centre the cuff's bladder approximately 2.5 cm(1 inch) above the site where you palpated the brachial pulse
- Wrap the cuff snugly around the client's arm and secure the end approximately
- Check the manometer whether if it is at the level with the client's heart.

8. Measure blood pressure by two step method by following these steps.

1. Palpatory method

- Palpate brachial pulse distal to the cuff with finger tips of non dominant hand.
- Close the screw clamp on the bulb.
- Inflate the cuff while still checking the pulse with other hand.
- Observe the point where pulse is not longer palpable.
- Inflate cuff to pressure 20-30 mmHg of above point at which pulse disappears.
- Open the screw clamp, deflate the cuff fully and wait for 30 seconds

2. Auscultation method

- Position the stethoscope's earpieces comfortable in your ears (turn tips slightly forward). Be sure sounds are clear, not muffled.
- Place the diaphragm over the client's brachial artery. Do not allow chest piece to touch cuff or clothing.
- Close the screw clamp on the bulb and inflate the cuff to a pressure 30 mmHg of above the point where the pulse had disappeared.
- Open the clamp and allow the aneroid dial to fall at the rate of 2 to 3 mm Hg per second.
- Note the point on the dial when first clear sound is heard. The sound will slowly increase in intensity.
- Continue deflating the cuff and note the point where the sound disappears. Listen for 10 to 20 mm Hg after the last sound.
- Release any remaining air quickly in the cuff and remove it
- If you must recheck the reading for any reason, allow a 1 minute interval before taking blood pressure

- Assist the client to a comfortable position
- Wash your hands
- Record blood pressure on the client's chart
- Replace the instruments to proper place

Figure 8.7 Checking Blood Prssure

8.4 ORAL HYGIENE

Oral hygiene (Mouth care) is defined as the scientific care of the teeth and mouth. Mouth care may be given for patients who are unable to take care of themselves.

The purposes of mouth care are

1. To keep the mouth clean, soft, moist and intact.
2. To keep the lips clean, soft, moist and intact.
3. To prevent oral infections.
4. To remove food debris as well as dental plaque without damaging the gum
5. To alleviate pain, discomfort and enhance oral intake with appetite
6. To prevent halitosis or relieve it and freshen the mouth

Equipments required for mouth care includes bath towel and mackintosh, one torch, Appropriate equipments for cleaning.

- Tooth brush or cotton balls (in case of unconscious patient)
- Gauze-padded tongue depressor
- Cotton ball with artery forceps -1 and dissecting forceps-1

Oral care agents

Tooth paste/ antiseptic solution according to the patient's preference
Kidney tray 1 or 2
Paper bag
Mug with tap water -1
Gauze pieces as required: to apply a lubricant
Lubricants: Vaseline/Glycerin
Disposable gloves -1 pair

Assisting the client with oral care

- Explain the procedures.
- Collect all instruments required.
- Close door or put screen.
- Perform hand washing and wear disposable gloves.
- If you use solutions such as sodium bicarbonate, prepare solutions required.
- Assist the client a comfortable upright position or sitting position. Otherwise the patient can lie on the bed with head end elevated.
- Inspect oral cavity.
- Inspect whole the oral cavity ,such as teeth, gums, mucosa and tongue, with the aid of gauze-padded tongue depressor and torch.
- Take notes if you find any abnormalities, e.g., bleeding, swollen, ulcers, sores, etc.
- Place face towel over the client chest or on the thigh with mackintosh.
- Put kidney tray in hand or assist the client holding a kidney tray.
- Instruct the client to brush teeth.

Points to be instructed to the clients

- Client places a soft toothbrush at a 45 °angle to the teeth.
- Client brushes in direction of the tips of the bristles under the gum line with tooth paste. Rotate the bristles using vibrating or jiggling motion until all outer and inner surfaces of teeth and gums are clean.
- Client brushes biting surfaces of the teeth.
- Client cleans tongue from inner to outer direction.
- If the client cannot tolerate toothbrush, form swabs or cotton balls may be used.
- Rinse oral cavity.
- Ask the client to rinse with fresh water and spit contents into the kidney tray.
- Advise him/her not to swallow the water.
- Ask the client to wipe mouth and around it.
- Confirm the condition of client's teeth, gums and tongue. Apply lubricant to lips if needed.
- Rinse and dry tooth brush thoroughly.
- Replace all instruments.
- Discard dirt properly and safely.
- Remove gloves and wash your hands.
- Document the care and sign on the records.

Providing oral care for dependent client

- Explain the purpose and procedure to the client.
- Perform hand washing and wear disposable gloves.
- Prepare equipment.
- Collect all required equipment and bring the articles to the bedside.
- Prepare sodium bicarbonate solution in cup. If the client is unconscious, use plain tap water.
- Soak the cotton ball in sodium bicarbonates solution (3 pinches of sodium bicarbonate / 2/3 water in a cup) with artery forceps.
- Squeeze all cotton balls excess solution by artery forceps and dissecting forceps and put into another bowl.
- Close the curtain or door to the room.
- Keep the client in a side lying or in comfortable position.
- Place the mackintosh and towel on the neck to chest.
- Put the kidney tray over the towel and mackintosh under the chin.
- Inspect the oral cavity for any abnormalities eg: bleeding.
- Clean oral surfaces.
- Ask the client to open the mouth and insert the padded tongue depressor gently from the angle of mouth toward the back molar area.
- Clean the client's teeth from incisors to molars using up and down movements from gums to crown of the teeth.
- Clean oral cavity from proximal to distal, outer to inner parts, using cotton ball for each stroke.
- Discard used cotton ball into a small kidney tray.
- Clean tongue from inner to outer aspect.

Rinse oral cavity

- Provide tap water to rinse mouth and position kidney tray.
- If the client cannot gargle by him/herself, rinse the areas using moistened cotton balls.
- Wipe mouth and around it. Apply lubricant to lips by using gauze piece with artery forceps.
- Reposition the client in a comfortable position.
- Replace all equipments in proper place.
- Discard dirt properly and safely.
- Remove gloves and perform hand hygiene.
- Document the care and sign on the records.

***Note* :** Oral care for the unconscious clients

1. Special precautions to be taken while providing oral care for the unconscious clients are the following

- The client should be positioned in the lateral position with the head turned toward the side. (Rationale: It can not only provide for drainage but also prevent accidental aspiration.)
- Use plain water for cleaning of oral cavity of unconscious clients.
- The remaining steps are the same as providing oral care for dependent client

2. Frequency of care

Oral care should be performed at least every four hours to reduce the potential for infection from micro organisms.

8.5 BED BATH

A bath given to client who is in the bed (unable to bath himself) is called as bed bath. Purposes of providing bed bath are

1. To prevent bacteria spreading on skin
2. To clean the client's body
3. To stimulate the circulation
4. To improve general muscular tone and joint
5. To make client comfortable and help to induce sleep
6. To observe skin condition and objective symptoms

Equipments required for bed bath

- Basins to take water-2, with soap-1 without soap-1
- Buckets 2, for waste water-1 For clean hot water -1
- Jug 1
- Soap with soap dish -1
- Sponge cloth 2, for washing with soap for rinsing -1
- Face towel -1
- Bath towel -2, for covering over mackintosh -1, for covering over client's body -1
- Gauze piece -2-3
- Mackintosh -1
- Old newspaper
- Paper bag for putting waste.

The procedure for complete bed bath includes the following

- Check client's identification and condition.
- Explain the purpose and procedure to the client. If he or she is alert or oriented, question the client about the personal hygiene preferences and ability to assist with the bath.
- Gather all required equipments. Organization facilitates accurate skill performance.
- Wash your hands and put on gloves.
- Bring all equipments to the bed-side.
- Close the curtain or the door.
- Prepare hot water.
- Remove the client's cloth. Cover the client's body with a top sheet or blanket.
- Fill two basins about two-thirds full with warm water (43-46^{o}C or 110-115^{o}F).
- Assist the client to move toward the side of the bed where you will be working.

Face, neck, ears

- Put mackintosh and big towel under the client's body from the head to shoulders. Place face towel under the chin which is also covered the top sheet.
- Make a mitt with the sponge towel and moisten with plain water.
- Wash the client's eyes. Cleanse from inner to outer corner. Use a different section of the mitt to wash each eye.
- Wash the client's face, neck and ears. Use soap on these areas only if the client prefers. Rinse and dry carefully.

Upper extremities

- Move the mackintosh and big towel to under the client's far arm.
- Uncover the far arm.
- Fold the sponge cloth and moisten.
- Wash the far arm with soap and rinse. Use long strokes: wrist to elbow, elbow to shoulder, axilla, hand.
- Dry bath towel.
- Move the mackintosh and big towel to under the near arm and uncover it
- Wash, rise and dry the near arm.

Caring for Fingernails

- Soak the nails by using the following steps Put a mackintosh with covering towel on the bed. Put the basin with warm water over the mackintosh. Soak the client's fingers in a basin of warm water and mild soap. Scrub and wash them up.Dry the client's hands thoroughly by using the towel covering the mackintosh
- Cutting the nails, trim the client's nails with nail clippers. Wipe all fingernails from thumb to little finger side by side by wet cotton ball. One cotton ball is used for one finger nail. Shape the finger nails with a file, rounding the corners and wipe both hands by a sponge towel
  Replace equipments and discard nail cuttings and cotton

Chest and abdomen

- Move the mackintosh and bath towel to under the upper trunk.
- Put another bath towel to over the chest.
- Fold the sponge towel and moisten.
- Wash breasts with soap and rinse. Dry by the big towel covering.
- Move the bath towel covering the chest to abdomen.
- Fold the sponge cloth and moisten.
- Wash abdomen with soap, rinse and dry.
- Cover the trunk with top sheet and remove the bath towel from the abdomen.
- Exchange the warm water.

Lower extremities

- Move the mackintosh and bath towel to under the far leg. Put pillow or cushion under the bending knee. Cover the near leg with bath towel .
- Fold the sponge cloth and moisten.
- Wash with soap, rinse and dry.
  Direction to wash from foot joint to knee from knee to hip joint.
- Repeat the same procedure on the near side.
- Cover the lower extremities with top sheet .Remove the cushion, mackintosh and big towel.

Caring for Toenails

Follow the same procedure as for the finger nails with some exceptions:
Cutting : Cut toenails straight across and do not round off the corners
Do not shape corners

Back and buttocks

- Turn the client on left lateral position with back towards you.
- Move the mackintosh and big towel under the trunk.
- Cover the back with big towel .
- Fold the towel and moisten. Uncover the back.
- Wash with soap and rinse .Dry with big towel .
- Back rub if needed

Back Care

While performing back care, you must follow the following steps

- Expose the client's back fully and observe it whether if there are any abnormalities.
- Lather soap by sponge towel. Wipe with soap and rinse with plain warm water
- Put oil into your palm. Apply the oil or the lotion and massage at least for 3-5 minutes by placing the palms.

1. From sacral region to neck
2. From upper shoulder to the lowest parts of buttocks

- Remove the mackintosh and big towel.
- Return the client to the supine position.

Perineal care

- Prepare the position
- Uncover the client's perineal area.
- Place a mackintosh and towel (or waterproof pad) under the client's hips

Female client

- Use a separate portion of the sponge towel for each stroke.
- Change sponge towel as necessary.
- Separate the labia and cleanse downward from the pubic to anal area.
- Wash between the labia including the urethral meatus and vaginal area.
- Rinse well and pat dry.

Male Client

- Gently grasp the client's penis.
- Cleanse in a circular motion moving from the tip of the penis backwards toward the pubic area
- In an uncircumcised male, carefully retract the foreskin prior to wash the penis.

- Return the foreskin to its former position.
- Wash, rinse, and dry the scrotum carefully.
- Assist the client to turn on the side.
- Cleanse the anal area, rinse thoroughly, and dry with a towel. Change sponge towel as necessary
- Assist the client to wear clean cloth.
- After bed bath: Make the bed tidy and keep the client in comfortable position.
- Document the procedure with your signature.

8.6 CATHETER CARE

Catheter care is an act of cleaning the catheter to the urethra and the outside of the hose and maintain catheter position

Purpose

a. Maintain cleanliness of the urinary tract

b. Maintain the catheter in place.

c. Prevent infection

d. Control infection

Equipments

Table / trolley which contains

a. Sterile gloves
b. Small bowl
c. Sterile gauze, sterile cotton balls
d. Artery forceps
e. Antiseptic solution
f. Distilled water / warm water
g. Adhesive plaster
h. Scissors
i. Paper bags

Procedure includes

- Prepare equipment
- Tell the patient the purpose of the procedure
- Provide privacy
- Wash your hands
- Wear sterile gloves

- Note the cleanliness and signs of infection of the perineum/penis and the catheters
- Clean the end of the urethra and the catheter using sterile cotton that has been moistened with distilled water / warm water in the direction away from the urethra (In females clean the perineum using sterile cotton balls)
- Clean the end of the urethra and the catheter using water + povidone with the direction away from the urethra
- Cover the penis and catheter with sterile gauze and then tape
- Return the appliance into place
- wash your hands
- Document the procedure

8.7 TRANSFERRING CLIENTS

Moving and Lifting Patients, Body Mechanics: Posture is important when moving or lifting an object or a patient. During all moving and lifting procedures, keep your back straight, and bend forward from the hips so that you use the stronger muscles of the back and abdomen. The patient's bed should be elevated to a comfortable working height. Check your footing. The feet should be parted to give a broad base of support. Get close to the person or object that is being lifted. Line up your body, straighten your back and bend at the knees and hips. Straighten the knees to lift. Lift smoothly to avoid strain. Work with the person helping you by coordinating movement. Shift the position of your feet to turn; do not twist your body. Push or pull an object instead of lifting it whenever you can.

Purpose of transferring clients are

- To move the patient or home equipment safely without causing injury
- To instruct the patient/care giver in safe body mechanics when making transfers or moving or lifting objects

Equipment required for the procedure include, bed or stretcher, chair, bed sheet, pillows, blanket, transfer belt

8.7.1 Assisting the patient into a chair when the patient is able to assist

1. Explain the procedure to the patient.
2. Assemble the equipment near a chair or a convenient work area.
3. Assist the patient to put on his or her shoes or slippers.

4. Put a transfer belt on the patient.
5. Place the bed in the lowest position possible.
6. Place a chair or wheelchair parallel to the bed. Lock the brakes on the wheelchair.
7. Assist the patient to the side of the bed and have the patient dangle his or her legs over the edge of the bed.
8. Stand directly in front of the patient.
9. Instruct the patient to push up from the bed, using his or her arms. Grasp the patient by the transfer belt from behind with both hands and assist the patient to stand. If a transfer belt is not available, instruct the patient to grasp your shoulders, and support the patient under the axillae while assisting him or her to stand.
10. Slowly pivot and sidestep until the back of the patient's legs rest against the chair. Gently assist the patient to sit down. Remove the transfer belt.
11. Cover the patient with a blanket as needed.
12. Provide patient comfort measures.

8.7.2 Assisting the patient into a chair when the patient is unable to assist

1. Explain the procedure to the patient.
2. Assemble the equipment near a chair or convenient work area.
3. Place a chair or wheelchair parallel to the bed. Lock the brakes on the wheelchair.
4. Put on the patient's shoes.
5. Assist the patient to a sitting position on the edge of the bed, with his or her feet flat on the floor. Put a transfer belt on the patient.
6 Stand directly in front of the patient. Lock his or her knees by bracing your knees against his or her knees.
7. Grasp the patient by the transfer belt from behind and assist him or her to stand. If a transfer belt is not available, support the patient under the axillae, and assist him or her to stand.
8. Pivot the patient one quarter turn, and gently lower him or her into the chair.
9. Secure the patient to the chair as necessary. Cover the patient with a blanket as needed. Provide patient comfort measures.

8.7.3 Moving the patient to one side of the bed

1. Explain the procedure to the patient/caregiver.
2. Assemble the equipment at the bedside or a convenient work area.
3. Standing on the opposite side of the bed from which the patient faces when turned on his or her side, advance one foot to give a broad base of support.
4. Keeping your body straight, bend forward from the hips.
5. Place one hand over the patient's shoulders, the other under the hips.
6. Draw the patient toward you by flexing your arms.

8.7.4 Moving the patient up in the bed when the patient is able to assist

1. Follow steps 1 through 5 of the procedure for moving the patient to one side of the bed.
2. Instruct the patient to bend his or her knees and on the count of three to push his or her heels against the mattress.
3. Tighten your hip and thigh muscles; on the count of three, bring your body toward head of bed as the patient pushes his body upward in bed at the same time.
4. Have the patient assist if a trapeze set or rope tied to side rail of bed is available

. 8.7.5 Moving the patient up in the bed when the patient is unable to assist

1. Follow steps 1 through 5of the procedure for moving the patient to one side of the bed.
2. With your feet pointing toward the head of the bed, move the patient up, using the momentum from a rocking motion.
3. Place a sheet that is folded lengthwise under the patient, positioning it to extend above the patient's head and below his or her hips. Stand at the head of the bed in the correct position, and pull the sheet toward you.

Nursing Considerations

Estimate the load to be moved or lifted. Do not attempt to lift or move a patient or an object by yourself if doubt exists regarding your ability to do so. Do not drag the patient up in bed; this action can cause shearing and can

damage the skin. Obtain a physician's order for rehabilitation services for limited mobility; inability to perform activities of daily living or the need for assistive devices, such as a cane, walker or a wheelchair

8.8 ASSISTING IN FEEDING

8.8.1 Feeding a helpless patient

You have to prepare the patient and environment in the following way:

- Wash hands before meals
- If needed, the mouth needs to be cleaned
- Give a comfortable position to the client
- Clean the bed surroundings
- Have a pleasant and cheerful conversation with the patient during meals
- Provide a pleasant appearance of food

Once the preparation of the patient is done, serve the food to the patient following these steps which includes

- Bring the food in a tray.
- The food should be hot and tasty.
- The towel is spread in front of the patient around the neck and chest.
- The tray i s placed on the table or conveniently.
- If the patient needs help, the nurse can help him to take the meals or the patient can take the meals by himself.
- If the patient is in lying down position, the nurse can help him in taking meals with the help of a spoon.
- If necessary, during the meal give water.
- After feeding remove the tray , wash the hands of the patient, clean the mouth and leave the patient in a comfortable position.
- Clean the articles and keep them in their places.
- Record the time and the kind of food taken by the patient.

8.8.2 Naso-gastric tube feeding

A naso-gastric tube feeding is a means of providing liquid nourishment through a tube into the intestinal tract, when the client is unable to take food or any nutrient orally (by mouth).

Figure 8.8 Nasal-Gastric Feeding

The purpose of naso gastric feeding are

1. To provide adequate nutrition
2. To give adequate amounts of fluids for therapeutic purpose
3. To provide alternative manner to some specific clients who have potential or acquired swallowing difficulties

Equipments required for naso–gastric feeding include

1. Disposable glove -1
2. Food as prescribed
3. Feeding bag with tubing-1
4. Water in jug
5. Large catheter tip syringe (30ml or larger than it) -1
6. Measuring cup -1
7. Clamp if available -1
8. Paper towel as required
9. Stethoscope -1

While performing naso gastric feeding, you have to follow the following procedure:

- Assemble all equipment and supplies for tube feeding.
- Prepare food like rava ganji. ragi ganji, juices or any other food in a liquid form.
- Explain the procedure to the client.
- Perform hand washing.
- Position the client with the head of the bed elevated at least 30 degree angle to 45 degree angle.

- Determine placement of feeding tube by aspiration of stomach secretions by the following steps:
- Attach the syringe to the end of feeding tube
- Gently pull back on plunger
- Measure amount of residual fluid
- Return residual fluid to stomach via tube and proceed to feeding.

Intermittent or Bolus feeding

Using the syringe, follow these steps

1. Clamp the tube. Insert the tip of the large syringe with plunger into the gastric tube.
2. Pour feeding into the syringe
3. Raise the syringe 12 to 18 inches above the stomach. Open the clamp.
4. Allow feeding to flow slowly into the stomach. Raise and lower the syringe to control the rate of flow.
5. Add additional food to the syringe as it empties until feeding is complete

Termination feeding

1. Terminate feeding when completed.
2. Instill prescribed amount of water.
3. Keep the client's head elevated for 20-30 minutes.

Mouth care

1. Provide mouth care by brushing teeth.
2. Offer mouthwash.
3. Keep the lips moist.

- Clean and replace equipment to proper place.
- Perform hand washing.
- Document date, time, amount of residual feed, amount of feeding, and the client's reaction to feeding.

8.9 ADMINISTRATION OF MEDICATION

8.9.1 Administration of Oral Medication

Medication is a drug used to diagnose, treat and cure as well as to relieve a person from signs and symptoms of an illness. It is given to a patient through different routes according to its kinds and indications and the most common route is through oral or PO (per orem). Nurses are having special skills in giving medications. There must be a zero error in adminis-

tering it. To prevent mistakes that may cause serious complications to patients, the following steps on how to administer medications orally should be followed.

Oral medication is defined as the administration of medication by mouth.
Purposes of oral mediction are

1. To prevent the disease, take a supplement in order to maintain health
2. To cure the disease
3. To promote the health
4. To give palliative treatment
5. To give as a symptomatic treatment

Equipments required

1. Steel tray -1
2. Drinking water in a cup-1
3. Doctor's prescription
4. Medicine prescribed
5. Medicine cup -1
6. Pill crusher/ tablet cutter if needed
7. Kidney tray/ paper bag (to discard the waste)-1

You have to follow the below mentioned steps for administration of oral medication:

1. Perform hand washing
2. Assemble all equipment
3. Verify the medication order using the prescription of doctor.
4. Prepare the medications to be administered.
5. Select the correct medication from the shelf or drawer and compare the label to the doctor's order

a. From the multi dose bottle : Pour a pill from the multi dose bottle into the container lid and transfer the correct amount to a medicine cup.

b. In the case of unit packing : Leave unit dose medication in wrappers and place them in a medication cup

c. Liquid medications : Measure liquid medications by holding the medicine cup at eye level and reading the level at the bottom of the meniscus. Pour from the bottle with the label upper most and wipe the neck if necessary.

6. Recheck each medication with the doctor's prescription.

7. When you have prepared all medications on a tray, compare each one again to the medication order.
8. Crush pills if the client is unable to swallow them.

a. Place the pill in a pill crusher and crush the pill until it is in powder form Do not crush time-release capsules or enteric-coated tablets.
b. Dissolve substance in water or juice to mask the taste.
c. If no need to crush, cut tablets at score mark only.

9. Bring medication to the client you have prepared.
10. Complete necessary assessments before giving medications.
11. Assist the client to a comfortable position to take medications.
12. Administer the medication in the following way.

- Offer water or fluids with the medication.
- Open unit dose medication package and give the medication to the medicine cup.
- Review the medication's name and purpose.
- Discard any medication that falls on the floor.
- Mix powder medications with fluids at the bedside if needed.
- Record fluid intake to maintain accurate documentation.

13. Remain with the client until he/she has taken all medication. Check the client's mouth if needed. Leaving medication at the bedside is unsafe.
14. Perform hand washing.
15. Record medication administration on the appropriate form.

a) Sign after you have given the medication.
b) If a client refuses the medication, record according to your hospital/agency policy on the Record(if the procedure is performed in the hospital setting).
c) Document vital signs or particular assessments according to your hospital's form.

16. Check the client within 30 minutes after giving medication.

8.9.2 Administration of insulin

A tray containing

- Insulin syringe with 8 mm needle
- Vial of insulin or pre loaded insulin device with appropriate needle
- Spirit swab in a bowl
- Kidney tray and paper bag

Preparing insulin syringe

- For pre mixed insulin, invert the vial of insulin backwards and forwards and roll gently between your hands approximately 20 times to ensure the insulin is well mixed. Do not shake.
- Take the insulin syringe and pull back the plunger to measure the amount of air equivalent to the amount of insulin to be drawn up. Expelling air into the vial prior to an injection creates a vacuum and makes it easier to draw out the insulin.
- With the vial standing upright, insert the needle straight through the centre of the rubber cap of the insulin vial and push the plunger down.
- Turn the vial upside down. Make sure that the point of the needle inside the vial is well beneath the surface of the insulin to avoid unnecessary air bubbles.
- Pull back the plunger until you have measured slightly more than the required dose of insulin. Flick or tap any air bubbles to the top of the insulin syringe, then push the plunger back to the desired dose expelling the bubbles into the vial. Air bubbles are not dangerous if injected into the recommended subcutaneous injection sites. This procedure ensures an accurate dose of insulin. If air bubbles persist, then expel all the insulin back into the vial and start again.
- Remove the needle from the vial and recheck the dose.

Preparing preloaded pen device

- Attach a pen needle. Pen needles come in a range of sizes.
- 8mm needles are recommended for the majority of patients, unless the patient is under weight or there is another injection-related issue identified by the specialist doctor - in which case smaller needle sizes can be used.
- Clean the skin with spirit swab.
- Inject the insulin into clean skin with clean hands.
- If using cloudy insulin, gently roll the pen ten times and invert the pen ten times. The liquid should look evenly mixed .
- Prime pen by dialing up to 2 units. Point pen upwards and depress injector button.
- Ensure insulin is expelled from needle – repeat priming process if no insulin seen.
- Turn the dose knob to the number of units to be administered.

- Ensure the patient's insulin is available in vials or prefilled pen device.
- Check the name of the insulin and dose against the patient's insulin prescription chart.
- Check insulin correctly stored and its expiry date
- Wash hands and put on gloves.
- Prepare the insulin syringe or pen device.
- Select the injection site.
- Raise the skin and insert the needle.
- Depress the insulin syringe or pen device and hold in place for a count of 10.
- Remove the needle and insulin syringe or device and dispose safely.
- Record the dose, timing and site of injection on the chart and initial.

Storage

- Unopened insulin vials/preloaded pens should be stored in the main body of the fridge at 2-8C. If stored in this way, the insulin remains useable up until its expiry date.
- Insulin in use should be stored at room temperature. Stored in this way, the insulin remains stable and useable for 1 month.
- Partly used insulin pens should never be returned to the fridge to be reused. They must be discarded.
- In hospital, insulin pens in use are stored with the patient in their locker. Opened vials are usually stored in the fridge and annotated with one month expiry.

8.10 SURGICAL WOUND DRESSING

Surgical wound dressing is defined as the cleaning, monitoring and promoting a wound or incision closed with sutures, clips or staples by applying sterile protective covering by using aseptic techniques.

The purposes of wound dressing are

1. To promote wound granulation and healing
2. To prevent micro-organisms from entering wound
3. To decrease wound drainage
4. To immobilize and support wound
5. To assist in removal of necrotic tissue
6. To apply medication to wound
7. To provide comfort

Equipment required for wound dressing are

A sterile tray containing artery forceps -1, thumb forceps -1, cotton swabs, gauze pieces, small cup or bowl for cleaning solution, surgical pads, kidney tray and sterile scissors.

A clean tray containing of sterile gloves-1, gauze dressing set containing scissors and forceps-1, cleaning disposable gloves if available-1, cleaning basin(optional)-1(as required), plastic bag for soiled dressings or bucket-1, waterproof pad or mackintosh-1, adhesive tape-1, additional dressing supplies as ordered, e.g. antiseptic ointments, extra dressings, acetone or adhesive remover (optional) and sterile normal saline (Optional)

Figure 8.9 Wound dressing

You have to follow the below mentioned steps while performing wound dressing

- Explain the procedure to the client.
- Assemble equipment needed.
- Perform hand washing
- Close the door and put screen or pull curtains.
- Position waterproof pad or mackintosh under the client if desired
- Assist client to comfortable position that provides easy access to wound area.
- Place opened, cuffed plastic bag near working area.
- Loosen tape on dressing. Use adhesive remover if necessary. If tape is soiled, put on gloves. It is easier to loosen tape before putting in gloves.
- Put on disposable gloves.
- Remove soiled dressings carefully in a clean to less clean direction.
- Do not reach over the wound.
- If dressing is adhering to skin surface, it may be moistened by pouring a small amount of sterile saline or normal saline onto it.

- Keep soiled side of dressing away from the client's view.
- Assess amount, type, and odour of drainage and document it.
- Discard dressings in plastic disposable bag.
- Pull off gloves inside out and drop it in the bag when your gloves were contaminated extremely by drainage.

Cleaning wound

a) **When you clean wearing sterile gloves**

- Open sterile dressings and supplies on work area using aseptic technique.
- Open sterile cleaning solution.
- Pour over gauze sponges in place container or over sponges placed in sterile basin.
- Put on gloves.
- Clean wound or surgical incision.

b. When you clean using sterile forceps

- Open sterile dressings and supplies on work area using aseptic technique.
- Open sterile cleaning solution.
- Pour over gauze sponges or cotton placed in the container or over sponges or cotton placed in the sterile basin.
- Clean wound or surgical incision.
- Follow the former procedure using sterile gloves.
- Dry wound or surgical incision using gauze sponge in the same manner.
- Apply antiseptic ointment by forceps if ordered.
- Apply a layer of dry, sterile dressing over wound using sterile forceps. If drainage is present
- Use sterile scissors to cut sterile 4inch x 4inch gauze square to place under and around the drain.
- Apply second gauze layer to the wound site.
- Place surgical pad over wound as outer most layer if available.
- Remove gloves from inside out and discard them in a plastic bag if you have worn.
- Apply tape to secure dressings.
- Perform hand washing.
- Remove all equipment and disinfect them as needed. Make him./her comfortable

- Document the following:
  1. Record the dressing change
  2. Note appearance of wound or surgical incision including drainage, odour, redness and presence of pus and any complication with your signature

8.11 SUMMARY

In this unit, we have discussed the basic nursing procedures which the nursing assistance should practice to meet the needs of the clients in the hospital, clinic or in the community. Gaining skill in these nursing procedures will help the care provider to address the holistic health care needs of the client.

8.12 SELF ASSESSMENT QUESTIONS

A. Fill in the blanks

1. Instrument used to measure BP is ————
2. Normal body temperature is ————
3. What are vital signs?
4. List the purposes of mouth care
5. List the articles needed for bed making
6. After giving nasogastric feed, elevate the head end at 30-60^0 for atleast ———mts.
7. Define occupied bed
8. What are the purposes of wound dressing?
9. A sterile wound is cleaned from ————to ———

B List the purposes of oral medication

8.13 GLOSSARY

Catheter : A catheter is a thin tube made from medical grade materials serving a broad range of functions.

Dental Plaque : Dental plaque is defined as the soft deposits that form the bio film adhering to the tooth surface. Plaque is composed of organic, in-organic materials derived from saliva, & bacterial products.

Medication : Any chemical substance, which may be natural or synthetic, that has a medical or pharmacologic effect on the body.

Wound : A wound is a type of injury which happens relatively quickly in which skin is torn, cut, or puncture

8.14 SUGGESTED READING

Potter PA : Fundamentals of nursing ed.5 2001 Harcourt India private Ltd. New Delhi.

Basavanthappa. B.T : Fundamentals of Nursing 2003, Jaypee Brothers

Kozier, Erb's : Fundamentals of Nursing ed. 8, 2007 Pearson Education

8.15 REFE RENCES

Shri Harnarayan asopa : Procedure in nursing practice ed. 1, 2004, Vora medical publications Mumbai.

Nancy : Principles and practice of nursing, Indore 1997, NR Brothers.