**Draft Study Material**

# HOME HEALTH AIDE

## Job Role

**(QUALIFICATION PACK: Ref. Id. HSS/Q5102)**
**Sector: Healthcare**

## CLASS 10

**PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION**
**(a constituent unit of NCERT, under Ministry of Education, Government of India)**
**Shyamla Hills, Bhopal- 462 002, M.P., India**
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# Preface

Vocational Education is a dynamic and evolving field, and ensuring that every student has access to quality learning materials is of paramount importance. The journey of the PSS Central Institute of Vocational Education (PSSCIVE) toward producing comprehensive and inclusive study material is rigorous and time-consuming, requiring thorough research, expert consultation, and publication by the National Council of Educational Research and Training (NCERT). However, the absence of finalized study material should not impede the educational progress of our students. In response to this necessity, we present the draft study material, a provisional yet comprehensive guide, designed to bridge the gap between teaching and learning, until the official version of the study material is made available by the NCERT. The draft study material provides a structured and accessible set of materials for teachers and students to utilize in the interim period. The content is aligned with the prescribed curriculum to ensure that students remain on track with their learning objectives.

The contents of the modules are curated to provide continuity in education and maintain the momentum of teaching-learning in vocational education. It encompasses essential concepts and skills aligned with the curriculum and educational standards. We extend our gratitude to the academicians, vocational educators, subject matter experts, industry experts, academic consultants, and all other people who contributed their expertise and insights to the creation of the draft study material.

Teachers are encouraged to use the draft modules of the study material as a guide and supplement their teaching with additional resources and activities that cater to their students' unique learning styles and needs. Collaboration and feedback are vital; therefore, we welcome suggestions for improvement, especially by the teachers, in improving upon the content of the study material.



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Date: 20 June 2024

## STUDY MATERIAL DEVELOPMENT COMMITTEE

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| Module 1 | Immunization |
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## Introduction

Vaccination is the process through which a person gets immense or resistant against communicable disease. India has the highest number of births in the world. An effective immunization programme reduces the burden of vaccines-preventable diseases to a great extent. Universal Immunization Program supports National and State governments to boost routine immunization. It is one of the most successful and cost effective public health investment the countries vaccine protect children against many diseases. Immunization has reduced child mortality rate to a significant extent. Basic knowledge of the process of immunization benefits the future generations and improve the health and life expectancy of our country. The Government of India provides vaccines free of cost to all children and pregnant women. This unit gives details on the process of immunization and the key components of universal immunization programs.

## Learning Outcomes

After completing this module, you will be able to:

- Differentiate between various types of immunity
- Prepare immunization schedule chart
- Identify the key components of universal Immunization Programme (UIP) Prepare List National Health Programme
- Identify the key components of pulse polio immunization programme

## Module Structure

Session 1: Differentiate between Various Types of Immunity

Session 2: Vaccination

Session 3: Key components of universal immunization programme (UIP)

Session 4: Pulse Polio Immunization Programme

# Session 1: Differentiate Between Various Types of Immunity

A strong immune system is the way to help and protect your body from infection. When your body is infected with bacteria, viruses or other infectious microorganisms (such as a fungus or parasite), it goes through the process of fighting the infection and then recovers itself. As a result, next time when our body encounters the same organism, you will be 'immune' to this infection. This means that you are less likely to get the same disease again, or if you do, the infection will be less severe. This is the principle behind vaccination.

***How does your immunity system work?***

When our body comes in contact with any foreign organism like bacteria or viruses. A complex group of reactions are formed in our body. There are two sets of defensive mechanisms in our body, one is called 'innate immunity' (natural) and the other is adaptive immunity' (Acquired).

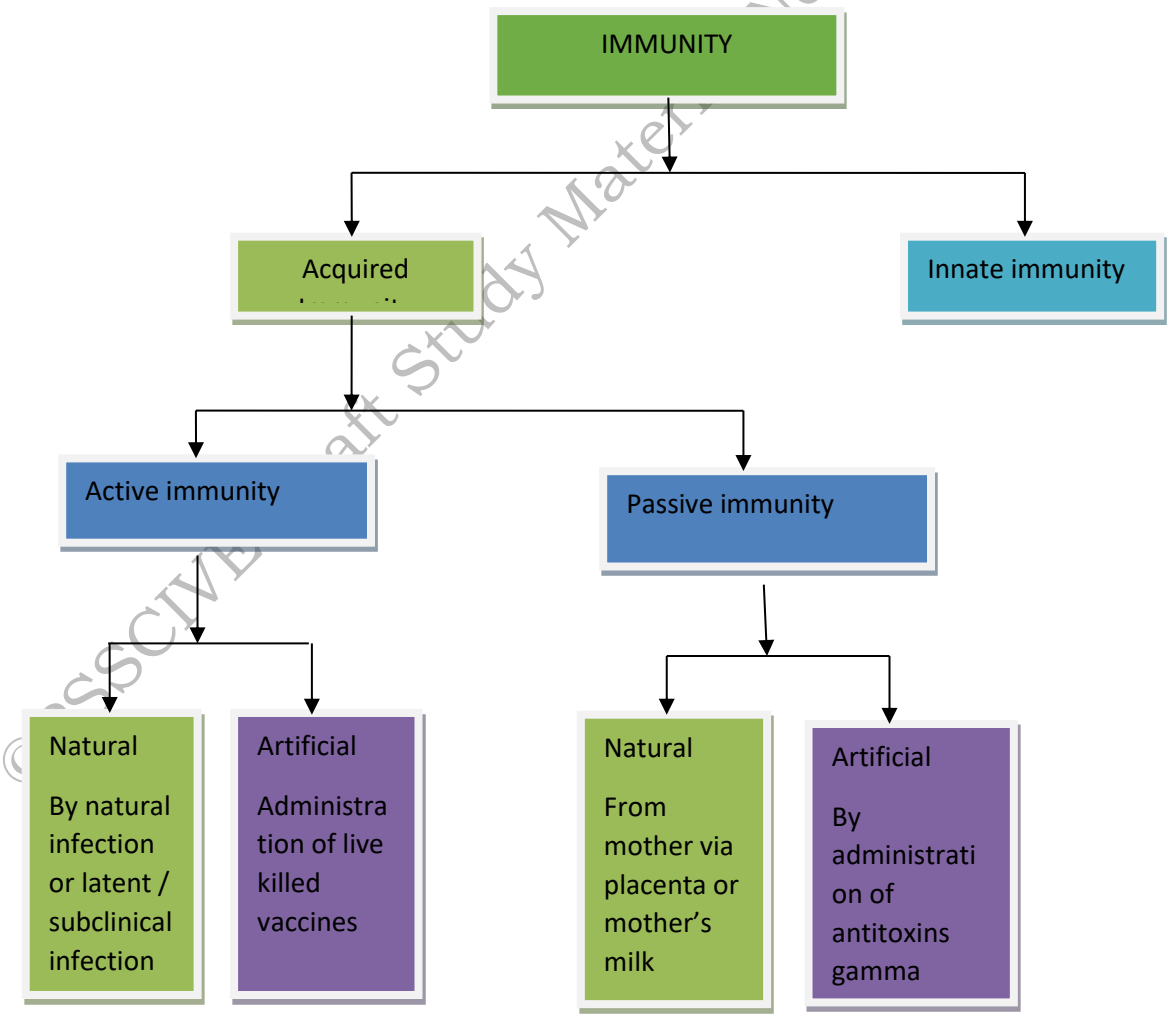



**Fig. 1.1: Immunity and its classification**

***How does your immunity system work?***

When our body comes in contact with any foreign organism like bacteria or viruses. A complex group of reactions are formed in our body. There are two sets of defensive mechanisms in our body, one is called 'innate immunity' (natural) and the other is 'adaptive immunity' (Acquired).

**Innate (Natural) Immunity**

Innate immunity describes the infections in your body that are already there within you, or congenital. Innate immunity known as natural immunity
These include:

- Skin
- Acid secretion in your stomach (HCL)
- Saliva secretion
- Eye tears
- Mucus in your mouth and nose
- WBC cells in your bloodstream destroy bacteria

All these systems are very important as the first line of defense to protect you from getting infected, and to get rid of the infections you have. These innate systems do not change with multiple infections.

**Adaptive (acquired) Immunity**

Adapting to fight infections with particular bacteria and viruses, your body can become immune to future infections caused by the same organism. This adaptation of your body is the basis for vaccination to prevent infection. This means that the next time when body encounter that infection, the immune power in our body starts against the infection, and gives protection.

*For example:*

- Antibodies are developed by the body against the infected organism. They can identify specific types of bacteria or viruses.
- The immune cells that are found in our body, are developed by our body, when an outside organism infects our body. They can identify specific types of bacteria or viruses. Then the antibody gets developed, and prevents our body from getting infected.
- Macrophages are specialized blood cells that can directly fight and destroy infectious organism, digesting them so that, disease could be prevented.

Vaccines trigger an adaptive immune systems that stimulates the body to produce antibodies to prepare for prevent future infections. Passive immunity is achieved through transfer of antibodies or activated T-cells from an immune host, typically lasting only a few months. Whereas active immunity is induce in the body itself by antigen and lasts much longer, sometimes lifelong.

**Differentiate between Passive and Active Immunity**

**Passive Immunity**

The anti-bodies produced in one body (human or animal) are transferred to another, to provide protection against disease, e.g. anti-tetanus serum, (ATS) anti-diphtheria serum (ADS). It differs from active immunity in that immunity is rapidly established; the immunity produced is of short duration and when the immediate protection is over, the individual is again fully susceptible to infection shown in Table 1.

**Active Immunity**

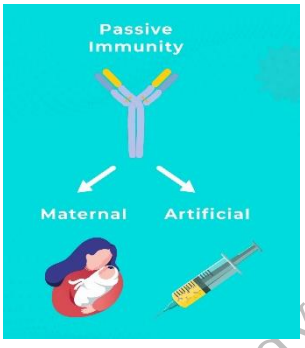
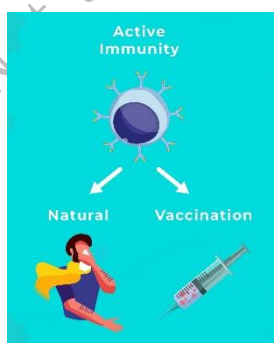
Active immunity is the immunity which the individual develops as a result of contact with pathogenic organisms or" their products. In this, the body is stimulated to produce its own anti-bodies. This immunity is specific for a particular disease. Active immunity can be acquired:

a) Naturally, as by infection with the particular organism e.g., measles, polio, diphtheria,
b) Artificial is administration by the vaccine

**Chemoprophylaxis:** Chemoprophylaxis is the administration of a specific drug before the disease has occurred e.g. use of anti-malaria in the prevention of malaria, 'penicillin in rheumatic fever, DDS in leprosy and INH in tuberculosis

**Table 1: Differentiate between Passive and active Immunity**

| S.N. | Passive Immunity | Active Immunity |
|---|---|---|
| 1. | Passive natural immunity it is not produced by immune response naturally but directly transferred. | Active natural immunity is naturally active by human body immune system |
| 2. | Passive immunity response is very fast against foreign pathogen. | Active immunity response is very slow process against foreign pathogen. |
| 3. | Natural passive immunity is not self generated it is directly transferred mother to fetus via placenta, mother milk (colostrum) | Natural active immunity is self generated antibodies lymphocytes against pathogens, nosocomial infection, micro -organism. |
| 4. | Artificial passive immunity is administered in human body by injection. Gama globulin, anti tetanus | Artificial active immunity is administered use vaccines in human body . Live & killed vaccines. |
| 5. | Artificial passive immunity is involved in preventing from | Artificial active immunity is effective fo long time duration. BCG, polio vaccine |

| | | |
|---|---|---|
| | disease for short time duration. (Tetanus injection) | |
| 6. | Artificial passive immunity is man made and it is costly. | Artificial active immunity is also man made it is costly. |
| 7. | Passive immunity is given artificial and active few weeks and months, given through outsources. | Active immunity is either natural or artificial, it is long life. |
| 8. | **Fig. ex - passive immunity**<br>Natural - receiving antibodies from another organism (such as a fetus via colostrum through breast milk).<br>Obtaining antibodies produced via artificial - external delivery (blood transfusion of monoclonal antibodies)<br>  <br><br>Fig.1.2: Passive immunity | **Fig. ex- active immunity**<br>Natural - Producing antibodies to counteract a pathogenic infection such as exposure to measles or cold.<br>Artificial - Producing antibodies in response to a controlled risk of a diseased pathogen (vaccination).<br>  <br><br>Fig.1.3: Active immunity |

## Activities

Prepare a presentation on "How does the immune system works?"

## Check Your Progress

**A. Fill in the blanks**

1. The body adaptation to prevent infection for the second exposure is _____ immunity.
2. The immune system is the body's way of protecting from _____.

3. The in-built systems that act are barriers to infection like skin, saliva, tears are the _____ immunity.

**B. Multiple choice questions**

1. **Human immunity protects from .....**
   a) Infectious pathogen
   b) Infectious microorganism
   c) Bacteria and viruses
   d) All the above
2. **Vaccination is preventing from.....**
   a) Communicable diseases
   b) Non Communicable diseases
   c) Bacterial diseases
   d) Viral disease
3. **The first line of defense to protect you from getting infected.....**
   a) Acid secretion in your stomach (HCL)
   b) WBC cells in your bloodstream destroy bacteria
   c) Saliva secretion
   d) All of the above
4. **The study of the immune system is called .....**
   a) Physiology
   b) microbiology
   c) Immunology
   d) Biology
5. **The immunity that transfers from one generation to another.....**
   a) Innate immunity
   b) Acquired immunity
   c) Active immunity
   d) Passive immunity

**C. Match the column A and B**

| Column A | Column B |
|---|---|
| 1. Natural active immunity | a. Administration of live killed vaccines |
| 2. Artificial active immunity | b. By natural or latent / subclinical infection |
| 3. Natural Passive immunity | c. administration of antitoxins gamma globulin |
| 4. Artificial Passive immunity | d. Immunity transferring from mother to child |

**D. Write the short answer questions**

1. Explain what is immunity and there classification.
2. State the Difference between Passive and active Immunity.
3. Write a short note on natural immunity.

## Session 2: Vaccination

**Immunization**

Immunization is to protects the children and adults against the highly infectious disease, before they make contact with others people in the community. Vaccination uses the body's natural defense mechanisms, to build resistance to specific infection. Routine vaccination in childhood can prevent nine infectious diseases - diphtheria, tetanus, whooping cough, poliomyelitis (polio), measles, mumps, rubella, Haemophilus influenza type B (HIB) and hepatitis B. Vaccination is given via injection or orally. Immunization helps children stay healthy by protecting them from serious infections.

**Fig.1.4: Immunization**

**Vaccination**

Vaccine is introduced in body to produce immunity power against specific disease. Vaccine functions by stimulating the immune system which is the human body's natural disease-fighting mechanism. Immunizations equips the immune system to fight off a disease. To immunize the body against viral diseases, the strength of the virus utilized in the vaccine has been decreased or the virus has been killed. It has been noticed that there can be improvement in the effectiveness of immunizations by periodic repeat injections or "boosters"

**Fig.1.5: Vaccine vial**

**Types of vaccines**

**Live vaccines:** These are preparations from live attenuated organisms. They are potent immunizing agents, e.g. BCG, oral polio, rabies, yellow fever and measles vaccines.

**Killed Vaccines:** organism killed by heat or chemical injected in to the body and stimulate active immunity e.g. vaccines against cholera, typhoid and whooping cough. They are not as efficient as live vaccines; therefore two or three doses are administered to increase antigenic efficiency.

**Toxoid preparations:** Certain organisms produce exotoxins, e.g., diphtheria and tetanus bacilli. The toxins produced' by these organisms are detoxified (rendered harmless) to prepare vaccines. Such products are called toxoids.

**Polyvalent vaccines:** Vaccines prepared from the culture of two or more strains of the same species, e.g., polio and influenza vaccines.

**Combined or mixed vaccines:** When vaccines include more than one type of vaccination agent, e.g. DPT, MMR, Pentavalent one vaccine against five disease.

**Vaccines commonly used in India**

DPT vaccine provides protection against diphtheria, whooping cough and tetanus. It is a mixture of purified diphtheria and tetanus toxoids and killed Bordetella pertussis organisms absorbed on aluminium hydroxide. Three doses of 0.5 ml. each are given and it is a administered by intramuscular injection with a booster dose.

DT vaccine is a protection against diphtheria and tetanus. It contains purified diphtheria and tetanus toxoid absorbed on aluminium hydroxide. The dose is 0.5 ml given intramuscularly.

TT vaccine is for protection against tetanus. It contains purified tetanus toxoid absorbed on aluminium phosphate.

The dose is 0.5 ml. administered intramuscularly.

**Polio vaccine (OPV)** is a live, attenuated trivalent vaccine containing three strains of polio virus. 2 drops of vaccine is given orally. Warm milk should not be given for at least half an hour after the vaccination.

**BCG vaccine contains** live attenuated tubercle bacilli and is freeze dried It has to be reconstituted before use with a diluents (normal saline). The diluent used for reconstituting BCG should be cooled before use. The dose is 0.1 ml given by the intradermal route, using a tuberculin syringe. The reconstituted vaccine should be used within 3 hours.

**Typhoid Vaccine** is a phenol killed vaccine containing the organisms Salmonella typhi and Salmonella paratyphi A. The dose is 0.5 ml. given subcutaneously.

**Measles vaccine** is live vaccine containing attenuated measles virus. It is freeze dried and has to be reconstituted before use. The dose is 0.5 ml which is given subcutaneously. Once reconstituted, the vaccine must be used within 4 hours.

**Cold Chain**

Vaccines are highly perishable and have to be stored at specific temperatures in order to maintain their efficiency. Vaccines are easily destroyed or lose their potency if exposed to heat and light. Therefore, they have to be stored and transported at specific temperatures. The system of storing and transporting vaccines at low temperature is called the Cold Chain. Even under these conditions the life of vaccines is limited. Storing and transporting of vaccines correct temperature so long time duration keep safe vaccines. So need cold freezers room, refrigerator, cold boxes, ice box, freezers.

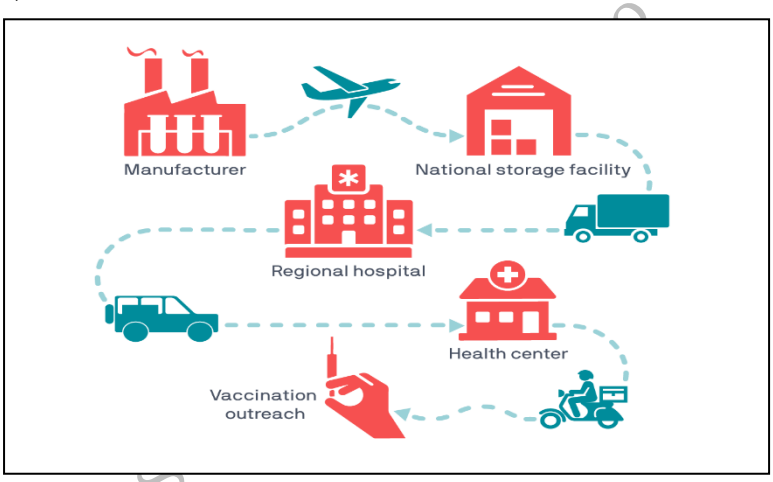



**Fig.1.6: Cold chain transportation**

**Importance of Immunization**

Every year, vaccines prevent the deaths of over 2.5 million children globally. The deaths of 2 million additional children every year can be prevented through vaccination with currently available vaccines.

- **Immunization saves a child's life:** Immunization helps to protect your child against various infectious diseases.
- **Immunization is safe and effective:** All vaccines given to children are completely safe and effective, as they have been tested by various medical professionals. Such as common adverse effects may be pain, redness, or tender feelings.
- **Immunization prevents diseases from spreading:** If a person is vaccinated, the risk of an epidemic is low. Thus, it also prevents the disease from spreading.
- **Immunization saves money and time:** Immunization saves money and time a chronic disease can affect our economy as well as our time. Immunization is a good method, as it saves both our time and money and promotes our good

health.

- **Immunization protects the future:** Immunization has helped to eliminate some degree of disease. Just like in polio eradication, if we continue to be vaccinated continuously, then in the near future we will be able to completely eradicate all these infectious diseases.
- Immunization has reduced mortality rate
- Immunization has made children more healthy and fit.
- Immunization promotes long life span.
- Immunization is protected from disease.
- It is very important must educate and awareness in community about the immunization programme.

**Side effects of immunization**

- The common side effects of vaccination are redness at the site of injection and accompanied by mild fever, pain, sore throat.
- Paracetamol may be needed to help reduce fever and soreness.
- While these symptoms can make you anxious and upset your child over time, the benefit of vaccination is protection from the disease.
- Other side effects are very rare but if they do occur, a doctor should be consulted immediately.

**National Immunization Schedule Chart**

The national immunization programmed is specialized program by the Govt. of India is started in 1985. Let us now read through the National Immunization schedule for Infants, Children and Pregnant Women to understand the importance of immunization against various diseases shown in Table 2.

**Table 1: National Immunization Schedule Chart**

| National Immunization Schedule for Infants, Children and Pregnant Women | | | | |
|---|---|---|---|---|
| **Vaccine** | **When to give** | **Dose** | **Route** | **Site** |
| **For Pregnant Women** | | | | |
| TT-1 | Early in pregnancy | 0.5 ml | Intra-muscular | Upper Arm |
| TT-2 | 4 weeks after TT-1* | 0.5 ml | Intra-muscular | Upper Arm |
| TT- Booster | If received 2 TT doses in a pregnancy within last 3 yrs* | 0.5 ml | Intra-muscular | Upper Arm |
| **For Infants** | | | | |
| BCG | At birth or as early as possible till one year of age | 0.1ml (0.05ml till 1mth age) | Intra-dermal | Left Upper Arm |
| Hepatitis B | At birth or as early as possible within 24 hours | 0.5 ml | Intra-muscular | Antero-lateral side of mid-thigh |
| OPV-0 | At birth or as early as possible within the first 15 days | 2 drops | Oral | Oral |
| OPV 1,2 & 3 | At 6 weeks, 10 weeks & 14 weeks | 2 drops | Oral | Oral |
| DPT 1,2 & 3 | At 6 weeks 10 weeks & 14 weeks | 0.5 ml | Intra-muscular | Antero-lateral side of mid-thigh |
| Hep B 1, 2 & 3 | At 6 weeks 10 weeks & 14 weeks | 0.5 ml | Intra-muscular | Antero-lateral side of mid-thigh |
| Measles | 9 completed months-12 months. | 0.5 ml | Sub-cutaneous | Right upper Arm |
| Vitamin-A (1stdose) | At 9 months with measles | 1 ml ( 1 lakh IU) | Oral | Oral |
| **For Children** | | | | |
| DPT booster | 16-24 months | 0.5 ml | Intra-muscular | Antero-lateral side of mid-thigh |
| Measles 2nd dose | 16-24 months | 0.5 ml | Sub-cutaneous | Right upper Arm |
| OPV Booster | 16-24 months | 2 drops | Oral | Oral |
| Japanese Encephalitis** | 16-24 months | 0.5 ml | Sub-cutaneous | Left Upper Arm |
| Vitamin-A*** | | | | |
| (2nd to 9th dose) | 16 months. Then, one dose every 6 months up to the age of 5 years. | 2ml (2 lakh IU) | Oral | Oral |
| DPT Booster | 5-6 years | 0.5 ml. | Intra-muscular | Upper Arm |
| TT | 10 years & 16 years | 0.5 ml | Intra-muscular | Upper Arm |

*Give TT-2 or Booster doses before 36 weeks of pregnancy. However, give these even if more than 36 weeks have passed. Give TT to a woman in labour, if she has not previously received TT.

** JE Vaccine, in select endemic districts after the campaign.

*** The 2nd to 9th doses of Vitamin A can be administered to children 1-5 years old during biannual rounds, in collaboration with ICDS.

## Activities

The teacher will take the student to the hospital and prepare a sample immunization schedule chart by the student.

## Check Your Progress

**A. Fill in the Blanks**

1. Immunization is protects the children and adults against the___.
2. _____ is a biologically man-made product that improves our immunity against infectious diseases.
3. The first vaccine small pox was developed in 1796 by _____.
4. _____ vaccine dose in the human body is given through the intramuscular route.

**B. Choose the True/False**

1. Polio vaccine (OPV) is not a live vaccine and is given to children over 5 years of age.
2. Typhoid vaccine dose are injected into the body via the subcutaneous route.
3. Vaccination prevents diseases from spreading and reduces the economic burden.

4. Cold chains are used to transport the vaccine and preserve it for a longer time.

**C. Write the short answer questions**

1. What is immunization?
2. Write short note on cold chain.
3. Write different types of vaccines and explain the vaccines that are commonly used in India against contagious disease.
4. What is the importance of vaccination in human life and write its benefits and its side effects.

## Session 3: Key Components of Universal Immunization Programme (UIP)

Universal Immunization Program, popularly known as UIP, It was started in the year 1985 and was implemented in all the districts of India till the year 1989-90. Immunization is one of the major areas under the National Rural Health Mission of the Government of India. Since 1997, vaccination activities are an important part of the national RCH program. Universal vaccination of populations may be required to control certain diseases. Such efforts typically target infants and children to complete immunity before exposure to infection (e.g. diphtheria, pertussis, tetanus, polio). Some vaccines may be required only for selected high-risk groups, (e.g. on the elderly at risk for pneumococcus). The effectiveness of healthcare delivery systems may also vary with the organization of the local healthcare system. The balance of losses and gains must be noted, where the lack of capital or logical limits makes continued universal vaccination impossible.

**Diseases prevented through vaccines used in the Universal Immunization Program (UIP)**

Presently, the Universal Immunization Program in India provides vaccines mainly to children below 5 years of age and pregnant women for the following preventable diseases:

1. Tuberculosis
2. Poliomyelitis
3. Diphtheria
4. Pertussis (whooping cough)
5. Measles
6. Tetanus
7. Hepatitis B
8. Japanese encephalitis (in endemic districts)

Vitamin A is not a vaccine, but a nutritional supplement which prevents many deficiencies related conditions. However, administration of Vitamin A is also a part of the Universal Immunization Program. Some other diseases have combined vaccines so as to avoid multiple shots, for example DPT for Diphtheria, Pertussis and Tetanus. This is also called a triple antigen. A pentavalent vaccine (5 vaccines

together) is also being considered for introduction in the UIP. This will include DPT+ Hepatitis B vaccine+ vaccine for Haemophilus B.

**Key Components of Universal Immunization Programme**

As a Home Health Aide, one would be responsible for all aspects of program management that would lead to the desired program output. The different aspects of program management include:

- Human resource
- Micro planning
- Capacity Building
- Logistics management
- Supervision and monitoring
- Data for action
- Social mobilization
- Financial resources
- Coordination and work environment
- Linkages with other maternal and child health interventions

**Indian government has been organizing various National Health Programme in health sector.**

**National Health Programme -** Indian govt. have started to organize national health programme after independence because the urban and village level public health condition is very poor. Our country have faced many dangerous public health problems. So our Indian govt. started National health programme to improve our health and prevent from highly communicable and non communicable diseases. it is a part of our health care delivery system that reaches health facilities to all, uptill the community level through the other health care system like community health center, primary health center, aanganwadi, etc. this resulted in improving the status of public health in our country. For example Polio is eradicated from our country. There are various following National Health Program are enlisted

| S.N. | National Health Programs |
|---|---|
| 1 | National Malaria Eradication program |
| 2 | Revised National tuberculosis control program |
| 3 | National AIDS control program |
| 4 | National Immunization program |
| 5 | National Pulse Polio eradication program |
| 6 | Mid day meal program |
| 7 | National leprosy eradication program |
| 8 | National cancer control program |
| 9 | National diabetes control program |
| 10 | National blindness control program |
| 11 | National failaria control program |
| 12 | National diabetes control program |
| 13 | Integrated child development services |
| 14 | National Guinea/yaws eradication programme |

| | | | |
|---|---|---|---|
| | 15 | National blindness control programme | |
| | 16 | National mental health Programme | |
| | 17 | National iodine deficiency control programme | |
| | 18 | Five year plans | |

## Activities

Prepare an Immunization schedule for a baby born on 10th April, 2020.

## Check Your Progress

**A. Multiple Choice Questions**

1. **Certain diseases may require universal immunization because:**
   a) Inability to identify target groups
   b) Immunization of high risks increases the risk of disease occurring
   c) Controlling these diseases require in immunization of the whole population
   d) None of the above
2. **Example of a vaccine which can be used to control many diseases in one shot:**
   a) Polio vaccine
   b) DPT also called triple antigen
   c) Chicken pox vaccine
   d) Pentavalent five in one vaccine (DPT, HepB, Hib)

**B. Write the short answer questions**

1. What is universal immunization?
2. Write the name of the vaccines used in the Universal Immunization Program (UIP)
3. Write down the key aspects of program management.
4. Prepare a list of national health programs.

## Session 4: Pulse Polio Immunization Programme

**Introduction**

**Pulse Polio** is an immunization campaign established by the government of India in 1995 - 96 to eradicate poliomyelitis (polio) in India by vaccinating all Children less than five years are administered polio vaccine against poliovirus. The project deals with methods of fighting poliomyelitis through a large-scale

vaccination program, collaborating with various international institutions, state governments and NGOs.

In India, vaccination against polio began in the Immunization Program (EPI) in 1978. By 1984, it was successful in covering approximately 40% of all infants, each given 3 doses of oral polio vaccine (OPV). The Universal Immunization Program (UIP) was started in the year of 1985, with the aim of covering all the districts of the country. It became part of the CSSM program in 1992 and the RCH program in 1997. The program helped cover 95% of the population. During 1987, the number of polio patients was 28,757 which decreased to 3,265 in the year 1995. After the World Health Organization's Polio Eradication Initiative 1988, India initiated the Pulse Polio Program in 1995 with the Universal Immunization Program, with the main objective being 100% coverage. In 2012, the WHO declared of India being free from polio

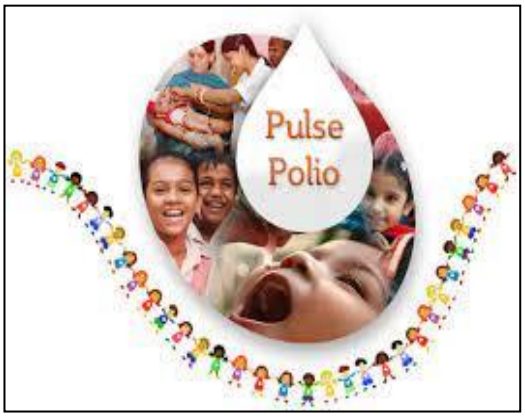



**Fig.1.7: Immunization programme**

**Importance of Pulse Polio Programme**

The Polio viruses are three related enteroviruses: type 1, 2 and 3. All three types cause paralysis. Type 1 causes paralysis most frequently. Polio is highly communicable having incubation period of 7-10 days. Transmission is mainly person-to-person via the fecal-oral route; that is poliovirus multiplies in human intestine and spread through feces. The virus is excreted for a month or more after infection. Communicability of infected children is highest during the first two weeks before the onset of paralysis and after paralysis. Protective immunity against polio virus develops by vaccination and natural autoimmune systems. Polio usually starts with common symptoms such as fever, headache, nausea, fatigue and muscle aches and cramps and is followed by more severe and permanent paralysis in one or more organs. Most cases of polio occur in children under 5 years of age. The child's immunity against polio virus is very low. Between 5 and 10 per cent of infected persons display only the most general symptoms while more than 90 per

cent show no sign of illness at all.

Polio vaccine is highly effective in producing immunity to the poliovirus and protection from paralytic polio. Approximately 90 per cent or more of polio vaccine recipients develop protective antibodies to all three poliovirus types after two doses, and at least 99% are immune following three doses.

Poliovirus does not survive for more than two weeks in environments outside the host, resulting in the elimination of poliomyelitis. For those who infected by the polio virus, there is no cure as such but there is treatment to alleviate the symptoms. Besides this, the affected persons can also be rehabilitated with the help of modern mobility aids. Heat and physical therapy may help the patient to stimulate the muscles and Antispasmodic medicines are given to relax the muscles of the limbs. Although it can improve mobility, it cannot completely cure permanent polio paralysis.

**Key components of Pulse Polio Immunization Programme**

Each of the following strategies is important components in the National Polio eradication programme:

(a) Routine Immunization: Maintaining a high level of coverage with three doses of oral polio vaccine to all children 0–5 years of age.
(b) Supplementary Immunization Activities (SIAs): Administer a dose of polio vaccine to all children aged 0-5 year's together increases immunity to children and also inhibits transmission of polio virus infection.
(c) Surveillance and investigation of cases of acute flaccid paralysis (AFP)

## Activities

Visit the Pulse Polio Immunization Camp and prepare a checklist of activities organized in the Pulse Polio Program.

## Check Your Progress

**A. Fill in the Blanks**

1. _____ is an immunization campaign established by the government of India to eradicate poliomyelitis.
2. In 2012, India was declared free of _____ by WHO.

3. Polio infection spreads highest prior to the onset of paralysis and the 1st two weeks after paralysis via the _____ route.
4. The polio virus multiplies in the intestines and spread through the _____.
5. The three related polio enteroviruses are _____, _____ and _____.
6. _____ developed Oral polio vaccine (OPV).
7. The three key components of pulse polio immunization program is routine immunization, supplementary immunization activities and _____.

**B. Multiple choice questions**

**1. Pulse Polio is an immunization campaign established by the**

a) Government of India
b) Ministry of health and family welfare
c) State government
d) All the above

**2. Polio virus has an incubation period in the human body**

a) period of 12-14 days
b) period of 7-10 days
c) period of 5-6 days
d) None of the above

**C. Write Short Answer Questions**

1. What is pulse polio immunization?
2. Write the importance of pulse polio programm.
3. Write the key components of National Polio eradication programme.

| Module 2 | Administration of Medication and Physiotherapy |
|---|---|

## Module Overview

Administration of medicine requires the attention and care of the treating doctors, nurses, General Duty Assistant or even a home health aide in emergency situations. The basic principle and methods of drug administration are described in this unit.

Methods of drug administration and its procedures have to meet licensing regulations in storage, safe handling and in dispensing of medicines. Medicines carry risks which can be serious threat to life if not dispensed to the patient properly. This unit provides information on the precautions to be followed while dealing with medication.

## Learning Outcomes

After completing this module, you will be able to:

- Demonstrate the knowledge of basic principles of drug administration
- Demonstrate the knowledge of forms and routes of medication
- Classify the drugs
- Demonstrate the knowledge of basic principles of physiotherapy
- Demonstrate the knowledge of principles and techniques of body mechanics.
- Demonstrate the knowledge of breathing and coughing exercises

## Module Structure

| |
|---|
| Session:1 Drug Administration |
| Session 2: Forms and Routes of Medication |
| Session 3: Classification of Drugs |
| Session 4: Health and Physiotherapy |
| Session 5: Introduction of body mechanics |

| |
|---|
| Session 6: Moving and Patient Positioning |
| Session 7: Breathing Exercise |
| |

## Session 1: Drug Administration

A drug is a substance in liquid, solid and semi-solid forms that affects human health and alters our physical functioning. **Drugs** take away control of your body & mind from YOU. **Medicines** reverse this and restore the control back to YOU. Its defined as a chemical substance capable of using as therapeutic like sedatives or narcotics.

**A medicine** is the substance that is used only for therapeutic purpose only and helps to restore 'normalcy' to your body & mind. Normalcy is actually your control over your own body & mind. Hence its action can be seen to be the exact opposite of the drug.

**Medicine Groups (Classification)**

Medicines can be grouped according to their use or function, or the system that they treat or their chemical makeup. For example, they can be grouped according to a body system like this:

- Respiratory medicines
- Cardiac medicines
- Nervous system medicines

They can also be grouped according to their function or use:

- Nonsteroid anti-inflammatory medicines (NSAIDs)
- Narcotic analgesics
- Antidepressants

Lastly they can be grouped according to their chemical makeup:

- Aminoglycosides
- Estrogens
- Opioids

Most of the medicines within a group are quite alike but they are not identical. Grouping helps us to see the things that are the same and the things that are different. One of the best ways to learn about a large number of medicines is to learn about groups first.

**Rights of drug administration**

**The Seven "Rights :** When helping a person you must check and double check that you are dealing with

1. The right patient
2. The right medicine
3. The right time
4. The right dose

5. The right route
6. The right form
7. The right documentation


**Fig. 2.1: The seven rights of drug administration**

**The Right Patient**

You must check the identity of the person before you help them with the medicines. If two patients of the same name are admitted to the same ward at the same time, so ask the patient bed number.

**The Right Medicine**

Do NOT use any medicine that has a label that you cannot read. Do NOT use any medicine unless it has a complete label. Read and double check the label against the medicine record at least three times and tell the person the name of the medicine before you help them. If the person says they do not get this medicine, STOP. Report this to your supervisor/doctor. If a patient takes the wrong medicine, it must be reported to the Doctor immediately.

**The Right Time**

The right time is 30 minutes before and up to 30 minutes after the time on the bottle and the order. For example, a person can take medicine anytime between 9:30 am and 10:30 am if the medicine is to be given once a day. It is an error if it is taken at 9 am or at 11 am. This, too, must be reported.

PRN (when needed) medicines are not taken at a special time of the day. They are taken only when they are needed but not more often than the order states. For example, the doctor may order aspirin q 4 h prn for pain.

This aspirin can be given when the person has pain but there must be interval of at least 4 hours between doses.

**The Right Dose**

The exact amount or dose of medicine should be checked and given to the patient.

Scored tablets must be cut in half if the label says 1/2 tablet. It is an error when the person takes more or less than he/she should. This error must also be reported.

**The Right Route**

Check the label to find out the right route. A buccal medication should not be swallowed (oral route). It is an error when a person takes a medicine with the wrong route. This error must be reported.

**The Right Form**

Check the label against the order to make sure that you have the right form. A pill cannot be given if the order says a liquid. It is an error when a person takes the wrong form. This too must be reported.

**The Right Documentation**

All documentation must be complete and accurate.

**Forgotten Medicines**

Report and document if the person forgets to take medicine or you forget to remind him/her it is time to take medicine.

**Observing and Record Keeping and Documentation**

You must observe for a person's response to medicine. Again, some of these responses are wanted and others are not. For example, you must take person's blood pressure to make sure that the medicine is making it lower when the person is taking a blood pressure medicine. This is a wanted effect. However, if that person becomes dizzy and their blood pressure is too low, this is NOT a wanted response. You must observe and record both the wanted and the unwanted responses to the person's medicine(s).

A medication that is taken, forgotten, held or refused by the patient must be written on the patient's medicine record. Other information like vital signs and apical pulse rate must also be recorded when it is needed. For example, the apical rate for a full minute must be taken and recorded before a person takes digoxin. If the rate is 54 or more, the person can take it. The dose must be held and the supervisor must be notified if the rate is less than 54. This must also be written in the person's record.

Complete medication records must include the following details of a patient:

- Full name
- Room and bed number
- Age
- Name of Doctor
- Description about allergies
- Medicine(s) to be taken
- Dose for each medicine
- Route for each medicine
- Form for each medicine

- Date and the time that the order was written
- Date(s) and time(s) that the medicine is to be taken/given
- Start and end dates of the order
- Initials signatures of all who have helped with the medicine(s).

Some of the legal rules for record keeping are:

- Do NOT use white fluid if you make a mistake. If you make a mistake, cross it off with one thin line. Do NOT cover the mistake with scribble. Write "error", sign your name and date
- Write so that other people can read what you write.
- Do NOT scribble.
- Use dark ink on records.

## Activities

1. Visit a nearby hospital and make a list of medicines given to patients there and collect the pictures.

| Components to be observed | Component present in the Medication Chart |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |

## Check Your Progress

**A. Fill in the Blanks**

1. A _____ is any substance that alters the physiological function with a potential for affecting health.
2. A _____ is defined as a substances used to promote health, prevention of illness, diagnose or cure disease.
3. _____ are medicines that are not taken at a special time of the day, but only when needed.
4. A drug is a chemical substance that is in liquid, _____ form.
5. Medicine can be defined as a substance used to, _____ diagnose, alleviate or treat disease.
6. All the patient's documents must be_____.

**B. Match the following**

| Column A | Column B |
|---|---|
| 1. Right medicine | a. Identify the person |
| 2. Right Patient | b. Check the clear label |
| 3. The right time | c. Error to be reported if dosage is less or more |
| 4. The right dose | d. 30 minutes before or after the time recommended |

**C. Write the answers to the following questions**

1. What is drug administration?
2. Classify medicine groups.
3. While giving the medicine to the patient, write down the seven rights that must be followed.
4. Write the importance of Record Keeping and Documentat

(d) To avoid interference with other drones

1. What is the primary purpose of calibrating equipment before drone pesticide and fertilizer application?
   (a) To enhance the drone's speed
   (b) To improve battery life
   (c) To ensure accurate chemical dosage
   (d) To increase flight range



## Session 2: Forms and Routes of Medication

Medicines are made in many forms and for many routes. Some medicines perform similar functions but in more than one form. Some medicines can enter the body through more than one route. The patient should be explained about medication, routes and forms.

**Enlist following forms of medicine**

Medicines Can Come in these forms :

- Tablets
- Capsules
- Syrups
- Elixirs
- Tinctures
- Ointments
- Pastes
- Creams

- Eye and Ear drops
- Oral suspensions
- Suppositories (vaginal & rectal)
- Intravenous fluid & solutions
- Metered dose inhalers Administration

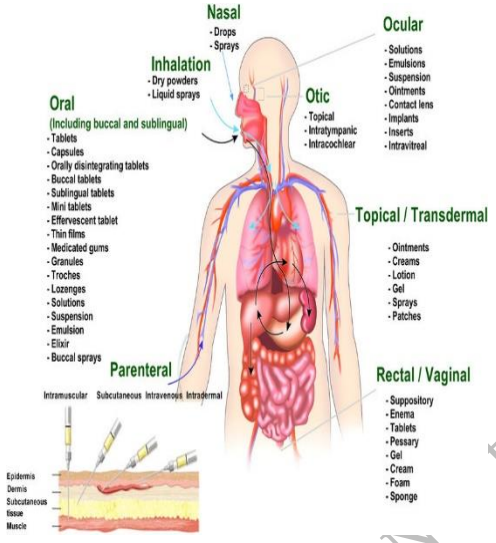



**Fig. 2.2: Route of Drug**

The following routes of drugs administered in the human body
Roots can be:

- Oral – by mouth
  A) Buccal (between gums and inside cheek)
  B) Sublingual (under the tongue)
- Topical – superficially on the skin
- Ophthalmic (eye)
- Otic – Ear
- Nasal
- Inhalation
- Via nasogastric or gastrostomy tube
- Vaginal route
- Rectal route
- Subcutaneous (under skin)
- Intramuscular (in the muscles)
- Intradermal (in the dermis layer of the skin)
- Transdermal (through the skin)
- Intraperitoneal cavity(medicine administered abdominal peritoneal cavity)
- Intravenous (into the vein)
- Intra cardiac (in the heart)
- Intrathecal (in the spinal cord )
- Intra – articular (in to the joint)

**Complete Orders**

The responsibility of a doctor or another person or a nurse, is to write a complete and legible order before giving medicine to the patient. A complete order must have the:

- Date of the order
- Time of the order
- Name of the medicine
- Dose
- Route
- Form
- Time or frequency that it should be taken
- Signature of the nurse

**Labels**

All labels must have the:

- Patient name
- Name of the medicine
- Strength of the medicine
- How much to take
- Route
- Form
- Time
- Date of the order
- Date that the bottle or container was filled
- Date that it expires and can no longer be used
- The name of the person who ordered it
- Any special instruction, such as keep out of light and cold place.

**Route and Form Considerations**

The oral route is the best route for children. When a patient has a problem with swallowing, as many older people have, the following things may be done.

- Crushing: Crushing the pill or opening the capsule and putting it in something like apple sauce can help. Time release capsules, some coated tablets, effervescent tablets, medicines that affect stomach, bad tasting medicines and sublingual medicines (those placed under the tongue) can NOT be opened or crushed. Check with the supervisor to find out if a medicine can be crushed.
- Liquid form: Using the liquid form of the medicine can also help those who avoid eating pills and capsules.

**Age Specific Drug Administration Route**

Infants

- For oral liquid medicines, use a syringe, dropper or nipple.
- Use a spoon or a ounce cup for liquid oral medicines. Preschool and School Age Children

- Most children in these age groups are able to take capsules and tablets. Adolescents
- Adult doses, routes and drug forms are now generally permitted.

**Medicine Routes**

A home health aide must be able to observe the patient or resident for the correct self-administration procedure. Below are routes that HHA can assist with nurse. Following are the common route of drug administration

**Topical (Skin Surface)**

Do not use on skin that is not intact unless, of course, the medicine is being used to treat broken skin. The procedure for using this route is:

1. Open the tube.
2. Place the top upside down to keep it clean.
3. Use gloves during medication.
4. Put the medicine on a tongue depressor. Use a cotton tipped applicator or sterile gauze for the face.
5. Apply it in long strokes going with the direction of the hair growth.

**Transdermal**

- Wash the area with soap and water.
- Find a place that has no hair on the person's upper arm or their chest.
- Dry the site.
- Put on gloves (Both the UAP unlicensed Assistive personnel and the patient)
- Put the dose on the patch or strip. Do not let it touch your own skin.
- With the medicine down and against the skin the person should be told to gently move the strip over a 3 inch area to spread it out. Do NOT rub.
- Cover with a plastic wrap or special dressing bandage and tie it in place so that it does not open.
- Write the date, time and your initials on the cover.

**Oral**

- Give the patient the medicine.
- Remain with the patient until the medicine(s) is swallowed.

**Buccal and Sublingual**

Buccal medicines are placed between the teeth and the inside of the cheek. Sublingual medicines are taken under the back of the tongue.

1. Give the patient the medicine.
2. Tell the person to put the medicine inside their mouth in (buccal) or under their tongue (sublingual) until it dissolves.
3. Tell the patient to leave the drug in its position so that it can be completely dissolved.

**Ophthalmic (Eye)**

- Using gloves during eye care prevent from infection. (Both the UAP and the patient).
- Help the person to a sitting position or into a supine position.
- Have the patient tilt their head back.
- Have the patient look up and away.
- Have the person steady their hand against their forehead with the dropper in their other hand.
- Pull down the lower lid.
- Put the number of drops into the space under the lower eye lid.
- Clean the excess off with a tissue.

**Otic (Ear)**

- Warm the ear drops to body temperature.
- Tell the person to place the drops against the side of the inner ear as you continue to hold the ear lobe in place until you cannot see any more drops.
- Have the person keep their head to the side for at least 10 minutes.

**Inhalation**

There are two types of inhalers that administer medicines with this route. These two types are:

- **Metered-dose inhalers**
- **Turbo inhalers**

**Indications for Use**

All medicines have special uses. Most of these uses are related to the wanted actions of the medicine. Some uses are related to the medicine's side effects. For example, diphenhydramine, an antihistamine is used for both allergies as well as for sleep because one of its side effects is drowsiness.

**Precautions and Contraindication**

Some medicines are contraindicated or not allowed to be used for some patients. For example, a medicine can be prohibited for patients that have severe renal or liver disease and those that are pregnant or breast feeding. Other medicines may only be used with some people when they are used with caution. For example, a medicine can sometimes be used, but only with caution, for an older person. It is essential to closely observe and report the patient's responses to the medicine when it is being used with caution. The most common contraindication is an allergy or sensitivity to the medicine. The patient's allergies must be known before you assist the person. If you see NKA on the patient's chart, this means that the person has No Known Allergies.

**Allergies**

A rash and even a life threatening reaction can happen if a medicine is taken by a person that has an allergy to it. Anaphylaxis is a very severe allergic reaction that can happen if a person is allergic to a food, like peanuts or shellfish, a substance,

like latex, or a medicine like penicillin or cephalosporin. It is a medical emergency that needs immediate attention.

**The signs are:**

- Itching
- Hives
- Swelling of the throat
- Troubled breathing (dyspnea)
- Shortness of breath
- A drop in blood pressure
- Irregular heart rhythm
- Nausea
- Vomiting
- Abdominal pains
- Death

**Side Effects and Adverse Reactions**

All medicines have side effects. The most common side effects are nausea and vomiting. Some **side effects** are troublesome; others can be life threatening. **Adverse drug reactions** are serious and they can also cause death. You must observe such allergic reactions and report them.

**Doses**

All medicines have special dosages and/or dosage ranges for adults and children patients. Some adult dosages may be lowered for the old person because the normal changes of the aging process make this age group more prone to side effects, adverse drug reactions, toxicity and an over dose. Children get medicine with a dose that is based on how much they weigh.

**Abbreviations**

Abbreviations save time, but, they can also lead to deadly effects. Some of the abbreviations that we have been using for many, years are now being stopped because they have led to serious errors. Commonly used and acceptable abbreviations along with their full form meaning are as follows shown in Table

**Table 3: Commonly used and acceptable Abbreviations**

| Abbreviation | Meaning | | Abbreviation | Meaning |
|---|---|---|---|---|
| **a.c.** | Before meals | | **MEq** | Milliequivalent |
| **ad lib** | Freely | | **Min** | Minute |
| **a.m.** | Morning | | **Mg** | Milligram |
| **ASA** | Aspirin | | **ML** | Milliliter |
| **b.i.d** | Twice a day | | **NBM** | Nothing by mouth |
| **BM** | Bowel movement | | **NTG** | Nitroglycerin |

| | | | | |
|---|---|---|---|---|
| **BP** | Blood pressure | | **p.c.** | After meals |
| **BS** | Blood sugar | | **p.m.** | Evening |
| **C-with line over** | With | | **p.o.** | By mouth |
| **Cap** | Capsule | | **Prn** | When needed |
| **Cc** | Cubic centimeter | | **Q** | Every |
| **disc or D.C.** | Discontinue | | **Qh** | Every hour |
| **disp.** | Dispense | | **Qid** | Four times a day |
| **Elix** | Elixir | | **SOB** | Shortness of breath |
| **Ext** | Extract | | **Sol** | Solution |
| **fl or fld** | Fluid | | **ss.** | One half |
| **g. or Gm. or g** | Gram | | **Stat** | Immediately |
| **Gr** | Grain | | **susp.** | Suspension |

## Activities

1. Visit a nearby hospital and identify the suitable routes and form of drug administration for the children in given age group. Fill the table given below with the suitable routes and form of drug:

| Age group | Form of drug | Routes of drug |
|---|---|---|
| Infant | | |
| Toddler | | |
| Adolescent | | |
| Adult | | |
| Elderly | | |

2. Visit a nearby hospital and observe the medication chart. Identify the meaning of standard abbreviation used in the medication chart. Fill the table given below with the full form or meaning of the abbreviation:

| Abbreviation | Meaning |
|---|---|
| a.c. | |
| a.m. | |
| b.i.d | |
| Cap | |
| NPO | |
| p.c. | |
| p.o. | |
| Prn | |
| | |

## Check Your Progress

**A. Fill in the blanks**

1. The _____is the best route for children.
2. Intradermal medicine is used in the _____of the skin.
3. Health professionals are to write a _____order before giving the medicine to the patient.
4. _____are taken under the back of the tongue.

**B. Match the following**

| | |
|---|---|
| Intravenous | a. in the heart |
| Intra cardiac | b. into the vein |
| Oral liquid medicines | c. Nitroglycerin |
| NTG | d. use a syringe, dropper or nipple |

**C. Multiple Choice Questions**

1. Identify the one which does not represent the form of medicine:
   a. Tablet
   b. Nasal
   c. Syrup
   d. Ointment
2. Buccal medicines are placed between the
   a. teeth and the inside of the cheek.
   b. under the back of the tongue
   c. upper the tongue
   d. between the teeth
3. The following information of the patient should be in order by the health personnel:
   a. patient name
   b. medicine name and route
   c) Strength of the medicine
   d) All of these

**D. Write the answers to the following questions**

1. List different forms of medicine.
2. Write the characteristics of complete order.
3. Write the routes of drug administration.

## Session 3: Classification Of Drugs

Drugs may be classified according to their chemical composition, clinical actions and therapeutic effect on body systems, their purpose and uses. Each class contains drugs prescribed for similar types of health problems. The class need not be the same. A drug may also belong to more than one class, e.g. aspirin is antipyretic, analgesic and an anti-inflammatory drug. Home Health Aide should have thorough knowledge about the general characteristics of drugs in each class. Each class of drugs has implications for proper administration and monitoring.

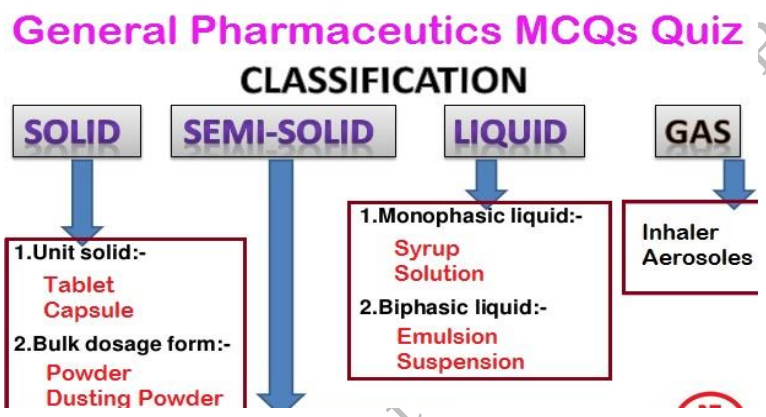



**Fig.2.3: Forms of drugs**

**Classification of Drugs**

The following are the major categories of drugs:

**Antacids**
**Uses**: Gastritis, peptic ulcer, hiatal hernia and reflux esophagitis.
**Examples of Medicines in this Group**:
- Aluminum carbonate
- Calcium carbonate

**Anticoagulants**
**Uses**: Heart attack (MI), pulmonary embolus (lung clots), deep vein thrombosis, disseminated intravascular clotting syndrome (DIC), and atrial fibrillation. It is also used with kidney dialysis.
**Examples of Medicines in this Group**:
- Warfarin sodium
- Heparin

**Anticonvulsants**
**Uses:** They prevent seizures.
**Examples of Medicines in this Group**:
- Phenytoin
- Diazepam

**Antidepressants**
**Uses**: Depression, Bed wetting for children.
**Examples of Medicines in this Group**:
- Sertraline
- Amitriptylyline
- Bupropion
- Phenelzine

**Antidiabetic Medicines**
**Uses**: Diabetes and ketoacidosis
**Examples of Medicines in this Group**:
- Insulin
- Glyburide

**Antidiarrheals**
**Uses:** Diarrhea
**Examples of Medicines in this Group**:
- Bismuth subgallate
- Kaolin and pectin mixtures

**Antifungals**
**Uses**: Fungus infections
**Examples of Medicines in this Group**:
- Nystatin
- Amphoteracin B

**Antihistamines**
**Uses**: Allergies.
**Examples of Medicines in this Group**:
- Diphenhydramine hydrochloride
- Chlorpheniramine maleate

**Anti-Infectives**
**Uses:** Infections
**Examples of Medicines in this Group**:
- Penicillin
- Tetracycline

**Antineoplastics**
**Uses:** Cancer
**Examples of Medicines in this Group**:
- Fluorouracil
- Cisplatin

**Antiparkinson Agents**
**Uses**: Parkinson's disease
**Examples of Medicines in this Group**:
- Levodopa
- Entacapone

**Antipsychotic and Neuroleptic Agents**
**Uses**: Psychosis and anxiety. They are sometimes used for unrelated hiccups, nausea, vomiting and child behavior problems, as well as relaxation before surgery.
**Examples of Medicines in this Group**:
- Haloperidol
- Chlorpromazine

**Antitubercular Medicines**
**Uses:** Tuberculosis
**Examples of Medicines in this Group**:
- Isoniazid

**Cough Medicines & Expectorants**
**Uses**: The expectorants are used for a cough from bronchitis, TB, pneumonia, cystic fibrosis and coronary obstructive pulmonary disease COPD. Antitussives a medicine is used for suppressing cough and reduce the activity of cough center in the brain.
**Examples of Medicines in this Group:**
- Guaifenesin
- Codeine

**Antivirals**
**Uses**: Infections caused by a virus like HIV, herpes and varicella.
**Examples of Medicines in this Group**:
- Acyclovir sodium
- Cidofovir

**Barbiturates**
**Uses**: Epilepsy, sedation, insomnia, anesthesia, and gall stones
**Examples of Medicines in this Group**:
- Phenobarbital
- Secobarbital

**Benzodiazepines**
**Uses**: Anxiety, acute alcohol withdrawal and pre-operative relaxation.
**Examples of Medicines in this Group**:
- Diazepam
- Clonazepam

**Bronchodilators**
**Uses**: Asthma, spasm of the bronchi, COPD, and Cheyne-Stokes respirations
**Examples of Medicines in this Group**:
- Albuterol
- Aminophylline

**Diuretics**
**Uses:** High blood pressure (hypertension) and edema
**Examples of Medicines in this Group**:
- Furosemide
- Hydrochlorothiazide

**Histamine H2 Antagonists**
**Uses:** Ulcers and GI reflux disease
**Examples of Medicines in this Group**:
- Cimetidine
- Ranitidine

**Immunosuppressants**
**Uses:** Prevention of organ transplant rejection
**Examples of Medicines in this Group**:
- Cyclosporine
- Azathioprine

**Laxatives**
**Uses:** Constipation, as bowel prep and a stool softener
**Examples of Medicines in this Group**:
- Psyllium
- Docusate sodium

**Nonsteroidal Anti-Inflamatories**
**Uses**: Mild to moderate pain, arthritis and dysmenorrhea
**Examples of Medicines in this Group**:
- Ibuprofen
- Naproxen

**Opioid Analgesics**
**Uses:** Moderate to severe pain
**Examples of Medicines in this Group:**
- Codeine

**Salicylates**
**Uses**: Mild to moderate pain, inflammation (arthritis), and for a fever
**Examples of Medicines in this Group**:
- Aspirin
- salsalate

**Thyroid Medicines**
**Uses**: Under active thyroid gland
**Examples of Medicines in this Group**:

- Thyroid
- Levothyroxin

## Activities

**Activity 1:** The teacher will take the students to the nearest hospital and fills in the table below with examples of the particular drug category used:

| Drug Category | Uses | Contraindication | Implications | Examples of medicines |
|---|---|---|---|---|
| Anticonvulsant | | | | |
| Bronchodilators | | | | |
| Immunosuppressants | | | | |
| Diuretics | | | | |
| Salicylates | | | | |

**Activity 2:** The teacher will take the student to the nearest hospital and collect all the pictures of various medicine and drugs in the hospital.

## Check Your Progress

**A. Fill in the Blanks**

1. _____ are used as stool softener in constipation.
2. The drugs used for controlling blood pressure are _____.
3. One of the common side effects of antidiarrheal medicine is _____.

**B. Match the following**

| Colum A | Colum B |
|---|---|
| 1. Opioid Analgesics | a. They prevent seizures |
| 2. Histamine H2 Antagonists | b. Depression, Bed wetting for children |
| 3. Benzodiazepines | c. Anxiety and pre-operative relaxation |
| 4. Antidepressants | d. Ulcers and GI reflux disease |
| 5. Anticonvulsants | e. Moderate to severe pain |

**D. Shorts answer questions**

1. What is Antacid?
2. write the common side effects of Salicylates?
3. write the uses of antacids?
4. write the contraindications and side effects of Nonsteroidal Anti-Inflammatory drugs.
5. Prepare a drug file containing the medicine pictures and write down its uses, side effects, contraindications and effects.?

## Session 4: Health And Physiotherapy

Physical activity plays an important role in enhancing the quality of life. It nature to the wholestic development of an individual. Physical fitness attributes to the healthy and efficient functioning of the mental, emotional and spiritual well-being of every individual. Physical activity includes life style activities, participation in active sports, muscle strengthening exercises etc. These activities can be considered as exercises which enhance physical fitness. The content of this unit describes the need for exercises and the way to do exercise which benefits in healthy living.

**Basic Principles of Exercise**

Physical exercises are often used to help restore a person's range of movement after injury or illness.

Physiotherapists are the healthcare professionals He is specially trained in physiotherapy. They work in various health sector and different places, including hospitals, community health centers and rehabilitation centers. Physiotherapist frequently treats problems that affect muscles, joints, cardiac, blood circulation and lungs. Physiotherapy helps people with suffering mental health conditions and neurological problems (affecting the brain and nervous system) and long term health illness.

**Principles of Physical Exercise**

The basic principle of exercise are to restore functional movement to a patient by decreasing pain, thereby allowing them to form and maintain normal range of movement.

The aim of physical exercise is to help restore normal body function, as well as treating a specific injury or illness. The physiotherapist may consider ways to improve the patient's general well-being and overall quality of life

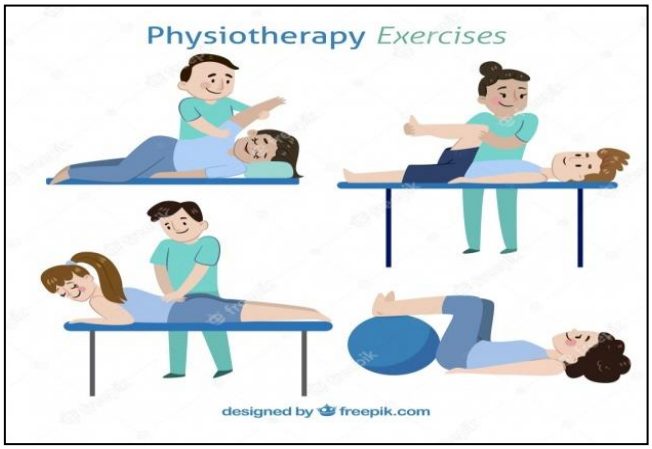



**Fig. 2.4: Basic physiotherapy exercise**

Exercise mainly takes a holistic view of the entire body, which means that it looks at the whole body rather than focusing on individual causes of injury or illness. For example, there can be many reasons for back pain, such as muscle tension, overstretching, bending awkwardly, standing and bending for long time period, improperly lifting or carrying

Patient education is an essential part of physical therapy. Only a physiotherapist can give good advice to the patient about the importance of exercise and can manage the patient's condition more effectively, for example by exercising the patient regularly.

**Indication**

Physical exercise can help people of all ages and social backgrounds. All people who have an injury or physical disability can take the benefit of physiotherapy, which includes people of all age groups. In particular, exercise can help rehabilitate (restore health) those who have had a Sports Injury. Physical exercise also use their knowledge and skills to help people overcome bone and joint conditions.

**Exercise can help treat people's problems**

**Bone and Joint Conditions**

Physical exercise focuses on the condition of bones and joints and the treatment of injuries. Physiotherapy exercise, in particular, helps patients who are recovering from orthopedic surgery (surgery to correct damage or deformity of bones or joints).

The physiotherapist can develop a program, which involves the use of strength training and exercises in improving the disability of the patient's body. They can also use electrical stimulation (the use of small electrical impulses to stimulate small nerves and muscles).

**Cardiac and Lung Conditions**

Exercise can help treat those people who have

- Chronic obstructive pulmonary disease (COPD), chronic bronchitis, emphysema, and chronic obstructive respiratory disease.
- Cystic fibrosis

**Neurological Conditions**

Physical exercises can help people with conditions that affect the brain and nervous system, Along with affecting a person's coordination, neurological conditions that can sometimes cause paralysis (inability to move) and muscles pain:

- Multiple sclerosis: A chronic disease condition that affects the central nervous system, primarily the brain, spinal cord and optic nerves, that is controls body functions such as movement and balance.
- Parkinson's disease: A chronic (long-term) condition that affects the way the brain coordinates body movements.
- Cerebral Palsy: It is a neurological disorder where brain damage affects the movement and muscles coordination of the child

**Childhood Conditions**

Physical exercise treats children with musculoskeletal conditions (which affect bones and muscles). For example, muscle development is a congenital condition (from birth to present) where a person's muscles gradually weaken over time, causing loss of strength and mobility. In cases of this type, an instructor using a treatment program that will help the person maintain muscle strength, increase flexibility, and prevent joint stiffness.

**Conditions that occur in Old Age**

Active physical exercises treat problems that occur in old age, such as the following:

- Arthritis - inflammation of the joints, lake of synovial fluid in joint cause pain and swelling, stiffness
- Osteoporosis - In osteoporosis, bones become thin and brittle

Exercise can be useful for patients who are recovering from hip replacement surgery. It plays an important role in taking good care of elderly people and helps them to be active and healthy by improving their overall health.

**Techniques used in Physical Exercises**

A physiotherapist conducts physical exercise using many different methods and techniques to overcome a person's injuries and short-term health problems and helps manage long-term disability. Using physiotherapy techniques can improve a person's ability to function in parts of the body that are affected by a health condition or injury and are unable to function. Physical exercises use a wide range of techniques and approaches. Massage, manipulation, exercise, energy based therapy and hydrotherapy.

**1. Massage**

The massage involves pressing or manipulating the soft tissues of the body using hands. It is suitable for most people and can be used to:

- Improves blood circulation (blood flow around the body)
- Help fluid drain from parts of the body more efficiently
- Improve the working movement of various body parts

- Reduce pain and help the patient for relax
- Conditions that are often treated of massage therapy include neck problems, headaches, stress and tension.

**Movement and Exercise**

The exercise program may include general exercise, walking or swimming, specific exercises to improve health problems for people recovering from injury or illness. And due to illness there is a problem in the functioning of the organs. A physiotherapist such as paralysis, stroke, looking at their affected organs can suggest specific exercises. These types of physical exercises are designed to strengthen the patient's body and improve the movement of the limbs, so that the person can perform the work of his daily life. They usually need to be repeated daily for a number of weeks. Patient's physiotherapist will advise patient about the exercises patient need to perform and will show patient how to perform them correctly.

**2. Energy Based Therapy**

It is a type of energy-based therapy, known as sound waves therapy, small current impulses, it is a means of healing, this energy is used to stimulate the nervous system, such as electric current or impulse (short time Electromagnetic/ ultrasonic sound waves). Electrical impulses make the patient's muscles contract and tighten, which may help reduce pain and promote further therapy. Energy-based therapies do not cause injury, although with some types, such as TENS, the patient may feel a mild tingling just below the patient's skin surface. Energy-based therapies include:

**TENS** - A transcutaneous electrical nerve stimulation (TENS) machine distributes an electric current to the nerves that send pain signals to the patient's brain and stimulates the secretion of endorphins (natural pain-relieving hormones).

**Ultrasound** - High-frequency sound waves treat deep tissue injury by stimulating blood circulation and cell activity in the body. It helps to reduce pain and muscle spasms and speed up the healing process.

**Laser therapy** - It is a form of medical therapy in which lasers (narrow beams of light) are used to reduce pain and muscle spasms. Laser therapy is considered to be the most effective in the treatment of tendon, although studies have shown that laser therapy is not as effective compared to other energy based therapies.

**Shortwave diathermy (SWD)** - It is an electrical machine that generates electromagnetic energy that produces heat within the tissues of the patient's body. It helps reduce inflammation (inflammation), strengthen tissues, and reduce pain.

**Hydrotherapy -** Hydrotherapy is a form of water therapy in which water is used for treatment, usually hot water, swimming pools and various hydrotherapy baths such as steam baths, hot and cold rain baths, foot baths. Water resistance (weight) pushes against the patient's body as the patient exercises while swimming. It helps in improving the blood circulation (blood flow) of the patient, relieves pain and relaxes the muscles of the patient.

## Activities

**Activity 1:** Visit a nearby hospital/physiotherapy centre/rehabilitation centre and write the use of techniques of Physiotherapy in different condition of the patients in the table given below:

| Techniques of Physiotherapy | Patient's Condition |
|---|---|
| Massage | |
| Exercise | |
| TENS | |
| Hydrotherapy | |

**Activity 2:** Tabulate different techniques of physiotherapy used for different conditions of the patient

| Patient's condition | Techniques of Physiotherapy |
|---|---|
| Bone and Joint | |
| Heart and Lung | |
| Neurological | |
| Childhood | |
| Old age condition | |



## Check Your Progress

**A. Fill in the Blanks**

1. Physical activity plays an important role in enhancing the_____.
2. The aim of _____ is to help restore normal body function.
3. The massage involves _____the soft tissues of the body using hands.
4. _____ High-frequency sound waves treat deep tissue injury by stimulating blood circulation and cell activity in the body.

**B. Multiple choice questions**

1. Energy-based therapy, known as
   a) Electro therapy
   b) Shortwave diathermy
   c) Hydrotherapy
   d) None of the above
2. A 26-year-old man suffered a right limb fracture following an accident. Which therapy helps to manage long-term disability.
   a) Recreational therapy
   b) Physiotherapy

c) Cognitive therapy
d) Electro convulsive therapy

3. In osteoporosis, bones become center is provided services……
   a) thin and brittle
   b) small and brittle
   c) large and brittle
   d) All of the above

**C. Short answer questions**

1. Write the functions of physiotherapy center?
2. Write the techniques of physical exercise?
3. Write the role of a physiotherapist during patient care services?
4. Write the importance of physiotherapy in our life?

## Session 5: Introduction of Body Mechanics

General considerations for performing physical task, due to the use of proper body mechanics and the steps involved in properly moving an object to a new location.

Some of the minor injuries are serious musculoskeletal strains while working by health care members. Therefore, while doing physical work, maintaining proper physical mechanics balance and doing the work carefully can prevent many types of small injuries and unnecessary excess fatigue.

**Definition**
Body mechanics is the use of the right muscles to complete a task safely and efficiently, without undue stress on any muscle or joint.

**Principles of Good Body Mechanics**
Maintain a Stable Center of Gravity.
Maintain a stable center of gravity.
1. Center of gravity should be kept low
2. Keep the back straight
3. Bend your knees and hips

Maintain a “Wide Base of Support”. This will provide maximum stability to the patient during lifting.
1. Keeping your feet apart.
2. Keep one leg slightly ahead of the other
3. Flex your knees to bear the brunt.
4. Turn with your feet.

**Fig. 2.5: Proper body mechanics**

Maintain "line of gravity". The line must pass vertically through the base.
1. Keep your spine straight.
2. Keep objects close your body.

Maintain “Proper Body Alignment”.
1. Tuck in your buttocks.
2. Pull your stomach in and up.
3. Keep your back flat.
4. Keep your head up.
5. Keep your chin in.
6. Keep your weight forward and support the outside of your feet.

**Techniques of Body Mechanics**

**Lifting**
1. Use the stronger leg muscles for lifting.
2. Keeping your back straight; bending over your knees and hips
3. Lift the object straight up in a smooth motion

**Reaching**
1. Stand directly in front of the object.
2. Avoid twisting or pulling.
3. Use a stool or ladder for high objects.
4. Maintain a good balance and a firm base of support.
5. Before moving the object, make sure that it is not too big or too heavy.

**Pivoting**
1. Place one leg slightly in front of the other leg.
2. Fold both legs at the same time, rotate the heel of one foot and the sole of the foot of the other.
3. Maintain a good center of gravity while holding or moving the object.

**Avoid Stooping**
1. Squat (bending above hips and knees).

2. Avoid stooping bending at the waist.
3. Use your leg muscles to return to your upright position.

**General Considerations for Performing Physical Tasks**

1. It is much easier to pull, push, or roll an object than to lift it.
2. The activity of lifting the object should be smooth and coordinated rather than jerky.
3. Less energy or force is required to keep an object moving and stop it.
4. Use the arm and leg muscles as much as possible, use the back muscles sparingly.
5. Keep the work as close to your body as possible. It reduces the strain on your back, legs and hands.
6. Rock forward or backward on your feet using your body weight to push or pull.
7. Keep the object at a comfortable height to avoid bending backward.
8. Keep your body in good physical condition to reduce the chance of injury.

**Steps Involved in properly transferring an Object to other place**

(i) Identify object that can be moved.
(ii) Adopt a stable base of support.
   1. Your feet are separated.
   2. One leg is behind the other.
   3. Your back is straight.
(iii) Approximately grasp the object at the center of gravity.
(iv) Using your hand and leg muscles, pull the object towards your body's center of gravity.
(v) Re-establish your base of support and proper body alignment.
   1. Your back is straight.
   2. You have a stable base of support.
   3. You are holding the object at waist height and close to your body.
(vi) Pivot toward the desired direction of travel.
   1. Start walking both feet at the same time
   2. Maintain an equal and stable balance
(vii) Re-establish a stable base of support and proper body alignment.
   1. Your back is straight.
   2. Your legs are apart, slightly back from each other.
   3. The object is close to your body, at the hip level.
(viii) Squat (bend down) and place the object on the lower area.
   1. Bend at the knees and hips.
   2. Maintain a straight back.
   3. Maintain a stable base of support and balance.
   4. Use your arm and leg muscles as necessary which will reduce fatigue.
(ix) Use your leg muscles to resume an upright position

## Activities

1. **Practice following good body mechanics:**
   a) Stable centre of gravity
   b) Maintaining wide base of support
   c) Maintaining line of gravity
   d) Maintaining proper body alignment
2. **Practice following techniques of body mechanics:**
   a) Lifting
   b) Reaching
   c) Pivoting
   d) Avoid stooping

## Check Your Progress

**A. Fill in the blanks**

1. ..... is the use of the right muscles to complete a task safely and efficiently.
2. Following proper body mechanics prevents fatigue, muscle strain, skeletal injuries and injury to the _____ and _____.

**B. Shorts answer questions**

1. Define body mechanics.
2. Write the basic principles of good body mechanics.
3. Explain various techniques of body mechanics.
4. Write the steps of transfer an object to another place



## Session 6: Moving and Patient Positioning

One of the basic procedures that a Home health aide performs most often is to move and change the patient's condition. Any position, even the most comfortable one, will become unbearable for a patient after a period of time. In this session, you will learn about the procedure adopted for moving and positioning the patients as per the need. To properly move patients using proper body mechanics, Perform the following techniques for patient moving:

**Pushing**

- Be close to the patient.
- Place one leg in front of the other leg.
- Place the patient on your hands, bend your elbows and keep the patient.
- Keep weight from your flexor to the extensor parts of your feet.
- Apply pressure with your leg muscles.
- To avoid fatigue, keep using alternate rest.

**Pulling**

• Keep the patient close to you while pulling
• Put one foot in front of the other
• Hold the patient, bend your elbows and lean your body away from the patient.
• Try to stay still
• Take rest to prevent fatigue

**Lifting and Carrying**
• Face the subject and be on squat position
• Maintain your centre of gravity while holding the subject
• Use your dominant leg when lifting.
• Hold the object from waist height.
• Keep your back straight while lifting the object .

**Reasons for Changing Patient's Positions**

The following are the reasons for changing the patient's condition on the bed:
1. It helps promote rest and relaxation.
2. This relieves pressure on the diaphragm.
3. It improves digestive (GI) function.
4. It improves respiratory function.
5. This allows greater lung expansion.
6. It prevents deformity and pain and the patient feels relaxed.
7. It stimulates blood circulation in the body.
8. This helps in giving a range of motion exercises for stress relief.
9. It improves respiratory function.
10. It allows for greater lung expansion.
11. It prevents deformities and pain.
12. It stimulates circulation of blood.
13. It helps in giving a range of motion exercises for relieving from stress.

Shearing of skin occurs when skin is dragged across a hard surface. The deep layers of the skin are torn by the resistance of being dragged, which in turn may lead to skin breakdown and ulceration. To prevent the shearing of skin and infection, position of the client is changed frequently. Common positioning postures and their brief description are given in the table below shown in Table 4:

**Table 4: Common positioning postures and their brief description**

| | |
|---|---|
| Prone | Face down |
| Supine | Lying on back |
| High Fowler's | Head of the bed elevated ($80^0$ – $90^o$) |
| Semi Fowler's | Head of the bed elevated ($30^o$ – $45^o$) |
| Dorsal recumbent | Supine with legs flexed in an elevated position |
| Knee – chest | Client rests on his knees and chest |
| Trendelenburg | Supine with head lower than feet |
| Lateral | Side – lying position |
| Sim's lateral(semi prone Left lateral position) | Between prone and side – lying position |

Regardless of the specific position, general principles of body mechanics must be utilized in changing any position. The following points must be remembered:
1. Maintain proper body alignment
2. Support all body parts

3. Avoid pressure especially over bony prominences by adequately padding these areas.
4. Use pillow, splints, foot boards and foam protectors which are helpful in maintaining the position.

**Prone Position**

In the prone position, the patient lies flat with chest and abdomen and head is turned to one side. The head rests on a pillow. One or both arms rest in a comfortable way either beyond the head or at the sides of the head.

1. Gives comfort
2. Relive pressure from pressure sore prone areas by providing a change of position.

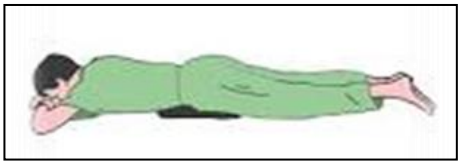


**Fig. 2.6: Prone position**

**Contraindication**

1. When patient is having respiratory or spinal problems
2. Clients after abdominal surgery.

**Supine/Dorsal / Horizontal Recumbent position**

The client is flat on the back with the feet and the knees are slightly flexed. Supine is horizontal position. Pillows can be used under the head, knees and calves to raise heels off the mattress: cotton rings at the elbow and heels, air cushion under the buttocks to take off the pressure and thereby prevent pressure sores. In bedridden clients, a foot rest is used to prevent the foot drop.

**Uses**

1. For the comfort of the patient
2. Assess vital signs temperature, pulse, respiration
3. Physical examination of head, neck, anterior thoracic and peripheral pulses.
4. After surgeries involving the anterior portions of the body.

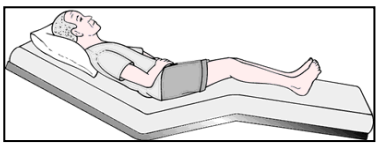


**Fig. 2.7: Recumbent position**

**Dorsal Elevated or Semi – recumbent Position**

Client lies in the bed with two or more pillow which may be arranged in armchair fashion to support the shoulders, arms and elbows. Additional comfort may be provided by means of pillow under the knees and foot support.

**Uses**

Clients with minor respiratory diseases.

**Lateral or Side–lying Position**

The client is on the side with weight on his hips and shoulders. Take the support of the pillow and stabilize the legs, hands, head and back. In the position the trunk is at right angle to the bed. To increase the base of support and comfort, one or both legs are bent and both arms are extended in front of the body. Because the body weight is borne on the shoulders and hips, the semi-prone or the semi-supine position is preferred. A pillow under the head supports the head, a pillow at the back gives support to the back, a pillow in front supports the arms and abdomen, a pillow in between the knees takes the weight off the upper leg.

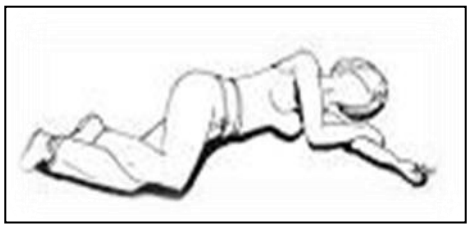


**Fig. 2.8: Lateral/side-laying position**

**Uses**
To relieve pressure on bony prominences of the back and sacral region.

**Contraindication**
Not to be used after hip replacement and other orthopedic surgery.

**Left Lateral Position**
In this lateral position, The patient is placed on the left side with a pillow under the head.

**Uses**
1. For giving enemas
2. For inserting suppositories
3. To check rectal temperature
4. For performing rectal examination

**Fowler's Position**
This is a more erect position, in which an effort is made to maintain the position of the client in sitting posture as nearly upright as possible. In this, the client's head is raised to 80°–90°. This position can be maintained by means of a back rest and additional pillows. The arms should be supported on pillows so that client sits with arms supported in an arm chair fashion. An air cushion under the buttoks prevents the pressure over the sacral areas. The knees may be raised over a knee pillow or a bolster to prevent the client from slipping.

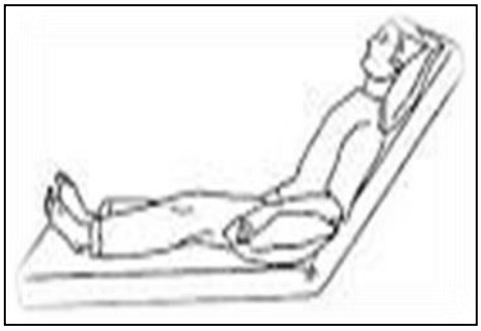


**Fig. 2.9: Fowler's position**

**Uses**
This position improves proper ventilation, promoting cardiac output.
This makes it easier for the patient to eat, talk and watch television.
1. To relieve difficulty in breathing (dyspnoea)
2. To relive tension on abdominal stitches.
3. To help in the draining of the abdominal cavity
4. This condition helps to relax the large muscles of the back and thighs.

This position gives the client a sense of well – being and makes it easier for self care.

**Contraindication**
Fowler position should not be given to the client after brain or spinal surgery.

## Activities

**Activity 1:**In the laboratory, the teacher demonstrates the common positioning postures and the students write a description of the various positions in the table given below:

| Position | Description |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

**Activity 2:** Demonstrate the following techniques to move the patient in the classroom: a. pushing b. pulling c. lifting and carrying

## Check Your Progress

**A. Fill in the blanks**

1. _____ positions are used to promote comfort of the client.
2. Supine position is lying on _____.
3. _____ position helps patient maintain sitting posture.
4. Use the _____ position to give the patient an enema before surgery.

**B. Match the following column A and B**

| S.No | A | | B |
|---|---|---|---|
| 1. | Prone | a | Side – lying position |
| 2. | Supine | b | Supine with head lower than feet |
| 3. | High fowler's | c | Client rests on his knees and chest |
| 4. | Semi Fowler's | d | Face down |
| 5. | Dorsal recumbent | e | Lying on back |
| 6. | Knee – chest | f | Supine with legs flexed in an elevated positio |
| 7. | Trendelenburg | g | Head of the bed elevated ($80^0$ – $90^o$) |
| 8. | Lateral position | h | Head of the bed elevated ($30^o$ – $45^o$) |
| 9. | Sims lateral | i | Between prone and side – lying position |

**C. Short answer questions**

1. Write the following techniques of patient moving.
2. What are the reasons for changing the patient's position?
3. Write the basic principles of body mechanics in changing patient position.
4. Write the fowler's position and their description.

## Session 7: Breathing Exercises

**Breathing Exercise:** Breathing exercise includes any form of exercise in which the person takes shallow fast breaths and slow and deep breaths. The most sophisticated form of breathing exercises have been developed in Yoga. Breathing exercise improves blood circulation, increases oxygen levels in the blood, improves the nervous system and attracts vital substances (of an unspecified nature) that are not normally inhaled.

**Deep breathing and coughing**

It is important to do deep breathing and cough exercise are important as these will help to lower patient's risk of lung complications, especially after surgery. Lung tissue is made up of several air sacs (alveolar sacs), which fully expand during normal breathing. After surgery, shallow breathing is common for the patient due to pain or limited mobility. Sometimes mucus secretions can accumulate in the patient's lungs and collapse the air sac. This is atelectasis when airway and air sac is not fully expanded and collapse.

**Fig. 2.10: Coughing exercise**

**Breathing deeply**

- Moves air down to the bottom areas of the lungs
- Opens air passages and expels mucus (cough is also easier)
- Supply blood and oxygen to the lungs, helps to increase circulation
- Reduces the risk of lung complications such as pneumonia and infection

Coughing helps to bring up mucus from deep inside the lungs. As patients do breathing exercises, patient may feel this in the back of throat or hear a rattling sound when patients breathe. Be sure to cough when this occurs.

**Coughing Exercises**

The most comfortable position in which the cough occurs is sitting upright. Hold a pillow or rolled blanket against stitches or staples. This may make coughing easier. When patient cough, relax neck and shoulders. Cough from belly, not from throat. Bending knees may also make coughing more comfortable. Cough two or three times, then take rest.

**Deep-Breathing Exercises**

Deep breathing exercise due to pain after surgery, patients often do not take deep breaths, causing mucus to accumulate in the lungs. Taking deep breath, take out the mucus and prevent it from collecting. Patient should continue deep-breathing exercises throughout there stay at hospital. The most comfortable position for taking deep breaths is on back with the head of the bed slightly raised.

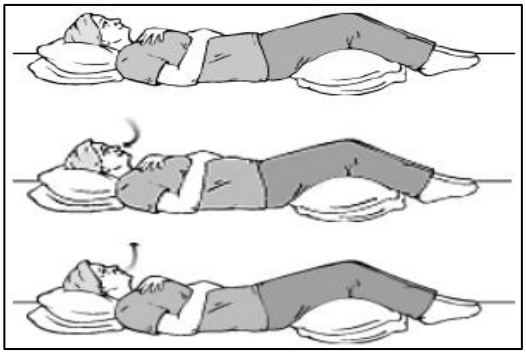


**Fig. 2.11: Deep breathing exercise**

Breathe in through nose and out through mouth. Ask to do each of the following exercises 10 times each hour patient are awake:

1. Put hand on abdomen between stomach and chest. Patient's hand should feel like it's on top of an inflating balloon. Now let the air out through mouth by relaxing.
2. Put patient's hands on the sides of chest. As patient take a deep breath, try to make patient's hands spread away from each other on either side of patient's chest. Now let the air out through mouth by relaxing.
3. A plastic breathing device called a Triflo (Flow meter) may be given to patient after surgery.

**Working of Triflo (Flow meter)**

The Triflo has three blue balls inside a clear plastic box. Make the balls rise by sucking air into patient's chest as patient would suck on a straw. The light blue ball comes up first, followed by the medium blue ball, and finally the dark blue ball. Try to hold up as many balls as possible, then relax, and let the balls drop.

**Pursed lip Breathing** (PLB) is the act of exhaling through tightly pressed, pursed lips. Physicians, physiotherapists, and respiratory therapists teach their patients techniques to reduce shortness of breath and promote deep breathing, also known as abdominal or diaphragmatic breathing. The purpose of PLB is to create pressure inside the airways to split them into open pressures; Thus moving air works less.

Spontaneous breathing through pursed lips, especially after physical exercise, is also one of the signs that health workers use to detect possible chronic obstructive pulmonary disease (COPD) in patients. When the patient has chronic obstructive pulmonary disease (COPD), shortness of breath can be a daily and unwanted fact of life. The HHA should help patients in doing the neck and shoulder relaxing exercises. The exercises include the following steps:

1. Relax neck and shoulder muscles.
2. Breathe through nose for two seconds, keep mouth closed.
3. Exhale for four seconds through pure lips. If this is too long for patient, simply breathe out twice as long as patient breathes in.

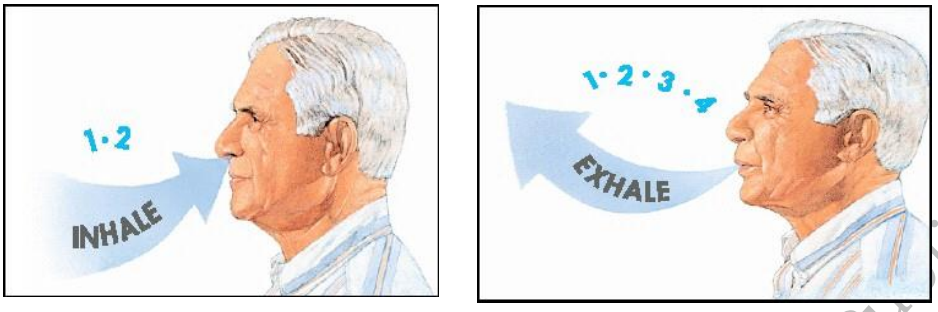



**Fig. 2.12: Pursed lip breathing exercise**

**Diaphragmatic Breathing**, **Abdominal Breathing**, **Belly Breathing** or **Deep Breathing**

Diaphragm breathing is abdominal breathing, belly breathing, or deep breathing, a contraction of the diaphragm, a muscle between the chest cavity and the abdominal cavity. Air enters the lungs and the abdomen expands during this type of breathing. This deep breath is marked by the expansion of the abdomen rather than the chest while breathing. It is considered by some to be a healthy way to breathe, and some useful forms of complementary and alternative treatments. Diaphragm breathing allows a person to breathe normally while maximizing the amount of oxygen going into the bloodstream. It is a way to inhibit the 'fight or flight' response and trigger the body's normal relaxation response. Deep breathing exercises are sometimes used as relaxation, when practiced regularly, can usually relieve or prevent symptoms associated with stress, including high blood pressure, headaches, and abdominal cramps.

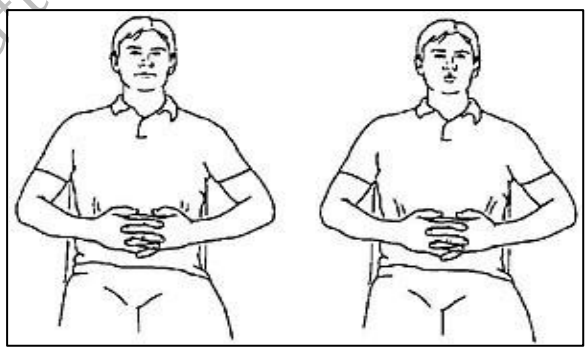


**Fig. 2.13: Diaphragmatic breathing exercise**

As opposed to higher (superior) due to lower (inferior) on the body due to lung expansion, it is called deep, and higher lung expansion of rib cage breathing is called shallow. With either means, the actual amount of air going into the lungs varies.

## Activities

Demonstrate the following exercises: a) Deep breathing and coughing, b) Diaphragmatic breathing, c) Abdominal breathing, d) Belly breathing

## Check Your Progress

**A. Fill in the blanks**

1. The most sophisticated form of breathing exercises have been developed in_____.
2. _____improves blood circulation, increases oxygen levels in the blood, and improves the nervous system.
3. The most comfortable position in which the cough occurs is_____.
4. The Triflo has _____inside a clear plastic box.
5. _____ is the act of exhaling through tightly pressed, pursed lips

**B. Write the full form**

1. PLB: _____
2. COPD: _____

**C. Short answer questions**

1. Describe the procedure of breathing exercise
2. Write the procedure of coughing exercise
3. Explain the working of triflo (flow meter).

| Module 3 | Geriatric and Child Care |
|---|---|

## Introduction

The process of planning and co-ordination care of elderly people to meet their physical and mental needs is geriatric care. It details working with persons of old age to manage their health and social care services. A care plan is tailored on the basis of a comprehensive assessment which includes health history, social history, activities of daily living, home safety, nutritional and physical assessment.

Early child care also is an important aspect of home health aide training. Child care facilities provided by Home Health Aide's include preparing daily care plan based on assessment and personal requirement. This unit describes the common issues of Geriatric care and Child care.

## Learning Outcomes

After completing this module, you will be able to:

- Demonstrate the knowledge of facts related to old age
- Identify the normal changes that occur at old age
- Demonstrate the knowledge of accomplishing basic needs of elderly people
- Demonstrate the knowledge of significance, purpose and techniques of the physical assessment of the patient
- Provide assistance in various examinations of the patient viz. eyes, ears, nose, throat, neck, chest, etc.
- Demonstrate the knowledge of caring of infants and children

## Module Structure

Session 1: Introduction to Care of Elderly

Session 2: Age Related changes in People

Session 3: Care of Elderly People

Session 4: Legal Needs of Elderly

Session 5: Nutrition through Life cycle

Session 6: Duties of Home Health Aide

Session 7: Care of Paralytic, Immobile Patient

| Session 8: Assist the Physician in Physical Examination |
|---|
| Session 9: Caring for Infants and Children |
| |

## Session 1: Introduction to Care of Elderly

Elderly care, or simply caring for the elderly (also known as aged care), is the fulfillment of special needs and needs that are unique to older people. It includes wide range of services such as assisted living, adult day care, long term care, nursing homes (often referred to as residential care), hospice care, and home care. Elderly care emphasizes the social and personal needs of seniors who require some assistance with daily activities and health services, but also some senior citizens who want to live life with dignity. And traditionally, caring for the elderly is the responsibility of the family and services are provided in the extended family home.

**Fig. 3.1: Care of elderly**

Ageing is an inevitable process of life. Sudden spurt in the population of elderly in a country is bound to pose multiple challenges before the human society. Ageing has gone beyond the realm of welfare concern and needs to be viewed as a developmental challenge. Many elderly people gradually lose functioning ability and require either additional assistance in the home or a move to an eldercare facility. Assisted living is one option for the elderly who need assistance with everyday tasks.

In India, children are usually taken care of by their elderly parents. Indian values demand respect and respect for older people.

A distinction is generally made between medical and non-medical care, care provided by people who are not medical professionals. It is important for caregivers that measures should be taken to preserve and promote work rather than worsen the condition of an older adult with physical limitations. Caregivers have to be aware of the tasks that reason the elderly to depend on them, and older patients need to maintain as much independence as possible. Providing information about why self-care is important to an elderly patient will give them an interest in self-

care independently and may see the benefits of self-care.

If the elderly are able to carry out their daily tasks and self-care activities easily, or they need supervision, then caregivers should be encouraged to perform their tasks, as they maintain independence. This can help them have a good experience and independently self-care for a long time. Use these words for these ages shown in Table 4:

**Table 4: Age appropriate nomenclature**

| **Age Groups** | **Age Span** |
|---|---|
| Infant | Birth to 1 year |
| Toddler | 1 to 3 years |
| Preschool child | 3 to 5 years |
| School age child | 5 to 12 years |
| Adolescent | 12 to 18 years |
| Young Adult | 18 to 45 years |
| Middle Age Adult | 45 to 65 years |
| Old Adult | Over 65 |



**Common health problems in old age people**

There are many things said about older people that are just not true.
Some of these myths are below:

- All old people are equal
- Elderly people cannot learn
- Elderly people are forgetful
- All elderly people are confused and weak
- Elderly people are sick and weak
- Older people get sick and sick with age
- Elderly people are not interested in exercise
- Old people depends on others
- Older people usually feel lonely, alone and withdrawn

Not all elderly people behave the same. It is generally not a good way to assess a person's strengths and weaknesses based on their age. As some 80-year old people exercise daily, some take college classes and some are very active in their field of work.
Old age does not affect our personality. it is made about that. Elderly people keep these personality differences by age.

Old people can still learn and they are not always “forgetful”. Aging does not mean that the person cannot learn. Some have short-term memory problems but they cope with this and can learn. Confusion is NOT a normal sign of aging.

## Activities

Observe the elderly people around you and write in the table the common health problems related to aging:

| S. No. | Common health problems |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |

## Check Your Progress

**A. Fill in the blanks**

1. _____is an inevitable process of life.
2. Good _____is required to keep teeth healthy and strong in elderly people.
3. Many old people remain active and involved with family, _____

**B. Multiple choice questions**

1. Normally a child between 5 to 12 years of age is .....
   a) Toddler
   b) Preschool child
   c) School age child
   d) Adolescent

2. Old age begins.....
   a) 45 to 60 years
   b) 50 to 55 years
   c) Over 65 years
   d) 60 to 65 years

**C. Short answer questions**

1. What is ageing?
2. Write the role of HHA in caring for elderly people.
3. Write the psycho social ageing.

## Session 2: Age Related Changes in People

In this session you will study about physical and psychological changes in elderly people. Most age-related biological functions are at their peak at the age of thirty and then decrease linearly with aging. The physical changes in the human body with age are as follows:

**Skin, Hair and Nails**

- Skin becomes more delicate soft
- Skin rashes are more common
- The skin may become dry
- Skin tags may appear, mostly on the neck.
- Skin may be thin and Wrinkles appear may have dry skin
- Hair fall and turn white
- Thin hair on the scalp and hair grow under the arms
- Nose and ear hair appear thicker and more visible
- Hair may appear on the face
- Finger nails and foot nails become thicker
- The function of sweat gland in the skin slows down
- Red or brown spots may start on hands and legs

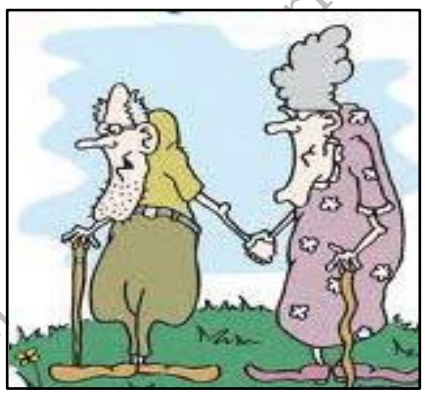


**Fig. 3.2: Age related changes in elderly people**

**Physical changes in Muscles and Bones**

- lack of calcium in bone.
- Bones become weak and thin.
- the spine become smaller, so the spine will have some curve
- Joints get less flexible and less mobile.
- Muscle tone gets decreases.
- The Muscle becomes loose, and build up fat.

**Respiratory System**

- The nose becomes dry.
- The vocal cord loses its elasticity so the person's voice may change.
- Decrease lung capacity
- Shortness of breath

• Dyspnoea (difficulty in breathing)
• Can start snoring

**Cardiovascular System**
• Decreased heart muscle tone.
• Increased size of the heart muscle.
• Increase in size on left side of heart.
• Lack of elasticity in cardiac muscles
• Lower output from the heart
• Abnormal heart and pulse rate the blood becomes thick
• Reduction in red blood cells and white blood cell count

**Gastrointestinal System**
- Gums pull back from the teeth so the teeth may get loose.
- Increase in the number of cavities.
- Less feeling of thirst.
- Less muscle tone at the end of the oesophagus to the stomach.
- Less saliva.
- Less digestion.
- Slower movement of the gastro intestinal tract.
- Smaller liver size.
- Lower stomach mucus production.

**Urinary System**
• The kidneys become smaller.
• Kidneys lose some of their function.
• Decreased blood flow to the kidneys.
• The density of urine decreases.
• The bladder becomes smaller.
• Holding power of the bladder.
• Loss of bladder muscle tone.
• Loss of bladder elasticity
• Feeling slow and reduced to requirement.
• Excess of urine at night (polyuria).
• Prostate gland enlargement in men.

**Nervous System**
• Brain size is small
• Brain weight loss
• Decreased blood flow to the brain
• Reflexes slow down.
• Decreased the number of nerves in the brain and whole body

**Eyes**
- Able to focus less.
- Eyelashes blink.

- Eyelids thin, short and short.
- A gray area around the cornea.
- Lower eye muscle tone.
- Lack of tears.
- People have far-sightedness. They cannot see objects that are near to them.

**Taste and Smell**

- Less taste buds.
- Less nose scent cells.

**Endocrine System**

- Less growth hormone (less muscle mass).
- Lower thyroid function.
- Less insulin.
- Less parathyroid function.

**Thinking and Emotional Changes and Needs**

Not all old people have a mental problem or confusion. These things are NOT a normal change. Most are fine in terms of their thinking, learning and communication, but some have a disease or problem that affects these things. Some of these problems are things like Alzheimer's and some drugs. It is also known that the personality of the person does not change, as the person gets old.

**Fig. 3.3: Age of thinking and emotional changes**

**Social Changes and Needs**

There are many social changes and needs for old people. Many of these are related to the fact that loved ones, both friends and spouses, may have died. Others miss working after they retire. Others may have a physical problem that does not let them to be with others as they used to do. For example, some old people lose their sight so they are not able to drive their car; some may have muscle weakness so they cannot take long walks as they used to.

**Legal Needs**

The elderly also have their own legal needs. Some of these special needs are:

- Maintaining rights and dignity
- Power of attorney/ other financial issues
- Prevention from being abuse

- Prevention from violence

## Activities

**Activity 1:** Understand the following needs with different age groups and fill the table given below:

| Needs | Elderly | Young Adult |
|---|---|---|
| Social needs | | |
| Thinking needs | | |
| Emotional needs | | |
| Special needs | | |

**Activity 2:** The teacher will take the student visit to the nearest old age home and prepare a list of their legal needs of elderly people

## Check Your Progress

**Choose the correct answer**

1. An older person is not able to fight infectious diseases because
   a) Their immunity decreases.
   b) Their immunity increases
   c) both a and B
   d) None of the above
2. Aging also affects the skin of older people, such as
   a) dryness of the skin
   b) itching
   c) skin irritation
   d) All of the above

**B. Complete the following words**

| | | |
|---|---|---|
| Res….rat…… | ……vascu | Gastro…… |
| U……narv | ……crine | Re……tiv |

**C. Short answer questions**

1. Why elderly people require special care.
2. Write the common health problems in elderly people.
3. Enlist the physical changes that occur in the human body with age.

## Session 3: Care of Elderly People

The common problems that elderly face and the procedures to be adopted for taking care of these problems. Provide care according to the problems faced by elderly people.

**Taking Care of Skin and Nails**

The skin becomes thinner, dry, pale, fragile, rough, less elastic, with less sweat glands and fat. The older person may get these problems as a result of these changes.

**Fig. 3.4: Care of elderly people**

- Skin tears (thin and fragile skin)
- Skin breakdown and pressure ulcers: The skin is thin, dry, fragile and has less cushion as the person ages.
- Skin cancer and sun burns. The pale and fragile skin makes the person prone to sunburns and skin cancer.
- Rashes and infections like contact allergies with some soaps and shingles.
- Less able to cope with heat and cold: The person may get too cold because they have less fat tissue. The person may also get too hot because they have less "cooling off" sweat glands.
- Pressure Ulcer: Patients who consume poor diet are at risk for pressure ulcers. Elderly people and patient who have been lying in the bed for a long time are at risk for pressure ulcers. People who do not have a common sense of pain and have the physical ability to turn, remain in the same position for a very long time until someone else replaces them. If a patient stays in one position for a long time, they will get a pressure ulcer. Friction occurs when a patient or resident is pulled up in bed or in the chair. Uneven pressure is created when sheets are wrinkled and dirty. This causes pressure ulcers.

A Home Health Aide should render the following care as par the needs of the patient:

**Dry skin care**: Skin lotions and mild soaps should be used. Also, the person does not always need a daily bath or shower.

**Skin tears and other skin breakdown**: The older person must not be gripped during a transfer. This can lead to a skin tear. Pressure ulcers are very painful and costly. People on bed rest are most at risk.

**Provide good skin care**: While bathing an older person or patient use mild soap and with soft washcloth, Rub and clean the skin thoroughly, then wipe with a clean dry and soft towel. Use of lotion helps to keep the skin healthy and soft. Do not use alcohols or alcohol base lotion on the skin, they dries the skin.

**Keep the skin clean and dry**: Remove all wet and dirty linen such as dirty clothes immediately, and do not leave the patient wet and dirty with other fluids including feces, urine, water, or tea, and wash the dirty skin thoroughly, and rinse and dry.

- Patients who stay in bed for a long period of time should move a chair or wheelchair and change their position at least every 2 hours.
- Encourage patients to walk around. Walking and moving about increases blood flow.
- Understand the need for the patient to use the commode or bathroom, and build them as per their requirement. If this order is given then follow the training programme schedule of the patient's bowel and bladder.
- Encourage the person to eat good nutritional foods and lots of fluids.
- Cushions, mattresses, beds, booties, elbow pads are used to reduce pressure, these items give less pressure when the patient stays in the bed or chair for a longer period of time.
- Do not raise the head of the patient's bed more than 30 degrees unless the doctor orders.
- Do NOT allow a patient to remain on a bedpan for a long period of time.
- Do not stretch a person's body with a bed sheet. Lifting equipment and sheets reduce friction and shear. They also prevent injury to the patient and staff
- The feet and toes should be washed and dried during every bath and kept clean. Leaving the area between the toes wet can lead to soft skin that could break down. It is also important to use a good skin lotion on the feet but NOT between the toes. This will soften the area and make it more prone to sores.
- Nails should be clean, short and smooth. Dirty fingernails spread infection. Jagged fingernails can cause injury. Nail care is done best when the person is sitting in a chair. If the person is not able to sit in a chair, it can be done in the bed.

**Taking Care of Bones**

As the body ages, the bones lose calcium, get weak, thin, brittle and weak. Spine get smaller. Joints become less flexible and less mobile. Many people get broken bones and fractures because of these changes. Falls can lead to injury and even death.

The most common problems of the bones are:

- Osteoporosis
- Osteoarthritis
- Rheumatoid arthritis
- Gout
- Bursitis

In order to provide necessary care to the bones, the HHA can help their patients in the following ways:

- Provide patient with a good healthy diet.
- Make sure that they get enough calcium and vitamin D.
- Encourage them to perform daily exercise. Active exercise and range of motion, Passive range of motion
- Encourage the person to walk and get out of bed
- Prevent falls
- Nurses and other people that work in homes, hospitals and nursing homes, like the doctor and the physical therapist, must assess a resident or patient for falls. They have to find out if the patient or resident is at risk for falls. Move the patient's bed and/or room closer to the nursing station.
- Regular rest and sleep.

**Taking Care of Muscle Problems**

Regular exercise is very important in order to maintain and improve muscle function. The HHA should help the patient to do range of motion exercise so that they can move their muscles and joints completely. HHA and other members of the team often help and/or remind the patient or resident to perform these exercises. When a person is not able to do these transfers they must depend on others for help and HHA can do it in better way. Teach the patient to practice how to walk up and down stairs using a handrail. When a person walks up the stairs they should put their good leg up on the stair and then bring up the weak one.

**Taking Care of Respiratory System**

The HHA should take all precautions to prevent lung infection and help patients to keep respiratory system normal. The following points should be kept in mind by the HHA while helping a patient in keeping his/her respiratory system fit.

- COPD is treated with a number of medicines, including those that dilate the lungs and keep the respiratory secretions thin so that they can be coughed up. Also advice good diet, plenty of fluids, oxygen, and deep breathing exercises.
- Lung cancer is treated with surgery, radiation and drugs. Pain, a poor appetite, nausea and vomiting may be issues with cancer patients. The HHA can provide the person with a good diet and fluids; make the person as comfortable as possible; and observe the person's coughing, chest pain and blood in the sputum. Report anything that is NOT normal.
- When the person has the flu, the HHA should observe the person's coughing, chest pain and blood in the sputum. Report anything that is NOT normal; and give the person as much comfort as possible.
- The treatment of pneumonia includes drugs to kill the germs supportively by rest, fluids, a good diet, pulmonary hygiene and oxygen. The HHA must observe all of their patients about their breathing, especially older people. They must immediately report anything that is not normal.

**Taking Care of Heart Problems**

The HHA should encourage patients to do mild exercises regularly.

- Exercise and a healthy weight also important in keeping the blood pressure at a good level.
- Heart attacks are treated with rest, oxygen, a number of different medications, including aspirin, which thins the blood, and pain medications to help the pain and to ease the amount of work that the heart has to do as a result of the pain. The HHA can help the person to prevent a heart attack by giving healthy diet, encouraging them to exercise and reminding them to take their heart medicines.
- The HHA can care for the person Peripheral Vessel Problems by encouraging the person to walk and then to rest if pain begins, checking the feet and toes regularly for any signs of a sore, giving the person good foot care, encouraging the person to stop smoking if they do so, giving the person a good diet with lots of fruit, vegetables and whole grains rather than fats and salt.

**Taking Care of Digestion Problems**

The HHA can help patients in taking care of their digestion related problems by performing the following activities:

- Advise the patient to eat small meal during the day. And getting up after a meal, sitting instead of resting or lying down. Providing the hernia patient with a good diet with low fat and caffeine.
- Encouraging not drinking alcohol or smoking and helping the person to cope with relieve stress.
- Report any pain or bleeding to the doctor.
- When HHA takes care of a person with incontinence, the area should be cleaned without an antiseptic or alcohol-free wipe. The area should be allowed to air dry, use cream on clean and dry skin to prevent skin breakage and to remove dirt from the skin. Cornstarch can also be used.
- The HHA should advise its patient to eat a good nutritional diet such as 40 grams of fiber per day, fruits, vegetables, bran, beans, whole grains, fluids such as water and juices and exercise on a daily basis.

**Urine System**

- Good hygiene, hand washing and encouraging the person to have water in their diet helps in preventing urine infections.
- Bladder training along with medicine and surgery is done, in some cases of Incontinence.
- Smaller meals, control of the diabetes, heart disease and high blood pressure, treatment of urine infections, low salt and protein in the diet advised to the patient with kidney failure.

**Nervous System**

- The HHA must maintain safety and ensure good nutrition to support patients who are suffering from lack of ability to do simple things like eating and wearing clothes.
- If a patient in the early stage of the nervous disease is able to dress and bath without help, he/she should help them to remain as active and as independent as possible. If the patient is at risk for falls, we must make sure that their room and the nursing unit is safe, secure, neat and uncluttered.

Keep the patient care area bright. Keep stimulation and noise to a minimum. Use large clocks, calendars and other things to orient the patient. Take away all clutter and dangerous chemicals, like medicines and cleaning liquids in order to ensure safety.

**Taking Care of Eyes and Ears**

The older persons, who have vision problems, need assistance with many activities of daily living (ADL), including dressing, walking and eating. The need for safety, freedom from falls, and other injuries (cooking fires) are of utmost importance. Encourage older patients to have regular, annual eye examination and use their eye drugs. The HHA should also observe and report any changes in the person's vision.

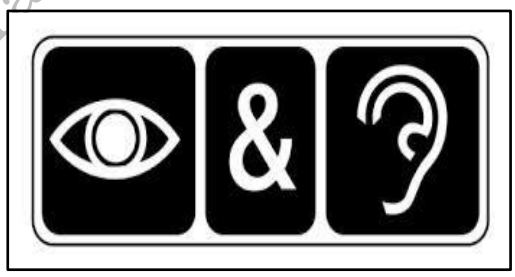


**Fig.3.5: Care of eye and ear**

Special low vision programme help patients on use of special things that help the person to read, write and do other things. For example, they may get special lighting, magnifiers, large print reading materials, computers that talk, clocks and watches that talk and/or have larger numbers.

The HHA should advice patients to use all the time hearing aid in case of hearing loss. Speak slowly and clearly while facing the person, keep information simple,

use words that the person can understand, use pictures and large print material. Provide enough light if the patient is reading. Repeat communication as often as needed so that the patient can understand it and remember it.

## Activities

Visit a nearby hospital and observe the care or treatment being given to elderly people. Fill the information in the table given below:

| Human Body Part | Problem Identified | Care or Treatment given |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

## Check Your Progress

**A. Fill in the Blanks**

1. _____ is important to maintain and improve muscle function in elderly.
2. The HHA must maintain safety and ensure good _____ to support elderly patients suffering from diseases.

**B. Short Answer Questions**

1. Enlist the Common problems faced by the elderly and procedures adopted to deal with these problems
2. Write the problems of skin and nails.
3. Enumerate the common problems related to sensory organs in old age
4. Describe the activities to be performed by HHA in providing care to elderly for the following:
   a) Care of Eye and Ear
   b) Care of Respiratory System
   c) Care of heart problems
   d) Care of digestive problems

## Session 4: Legal Needs of Elderly

The Home Health Aide (HHA) and other healthcare workers care for old patients and residents all over the world. In the India today there are more aged people than people of any other age group. The HHA is to provide safety, security, food and fluid needs of the elderly people.

**Some Tasks for the Elderly**

Erik Erikson, a psychologist, listed 8 major developmental tasks that every person must accomplish during life. The Home Health Aide and other healthcare providers must know about these major tasks. For example, to take care of adolescents one must know that adolescents have to cope with identity formation- "Who am I?". A hospital staff can affect an adolescent's sense of self, it can also help to keep in touch with their friends or peer group; a group that is much more important to them than their own family. Their peer group helps them to define who they are.

According to Erikson, older adults want to share their wisdom, maintain their sense of self, maintain integrity and be happy with what they have done. Old adults who can NOT do these tasks may be sad, depressed and unhappy. They may view their life as worthless and without meaning. They may think that they are useless. Some may feel that they are a burden to their family, friends and healthcare workers. Old adults also have to deal with losses. They may lose their husband or wife, their friends and other people who they loved. They may feel lonely and not loved. They can also be very sad and depressed. As they get older and lose their own mental and physical health, they may NOT be able to care for themselves any more. This may make the patient or resident sad or angry. As a healthcare provider, we should listen to the older patient when they talk about their losses and their thoughts about death.

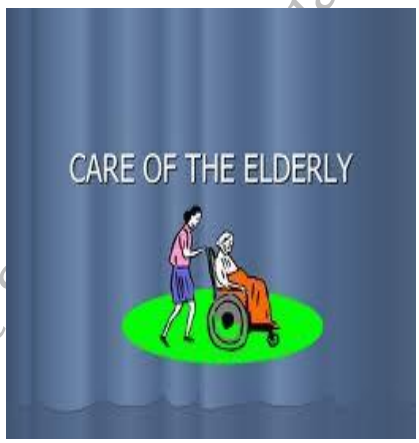



**Fig. 3.6: HHA is provide health services**

**Thinking and Learning Abilities**

Old age stage affects people's thinking and ability to learn how we give them and their family people instruction and education. Older adults need special care during exercise to communicate and instruct, etc. In old age, there are physical and mental problems that can affect the ability to learn and think.

Older adults may have:

- A short attention span: Old adults may not be able to understand long and detailed information. They may do better with short instructions.
- Less learning ability: Old people may not be able to learn new things as well as they did in the past.

- Less ability to understand: Many older adults are confused and not able to understand.
- An inability to communicate: Older adults may not be able to speak and ask questions. After a stroke, many patients have aphasia; a lack of ability to speak.
- Poor hearing and sight: Vision and hearing gets poor as humans age. GDA and others must give a patient their eyeglasses and/or their hearing aid so they can communicate easily.

When a HHA are communicating with an elderly patient, he/she should:

- Give the person their eyeglasses and hearing aid, if they have one
- Speak slowly and clearly while facing the person
- Keep information simple
- Use words that the person can understand
- Use pictures and large print material
- Provide enough light if the patient wants to read
- Keep sessions short
- Repeat communication as often as needed so that the patient can understand it and remember it
- Allow enough time for the patient. Some patients need more time than others
- Make sure that the area or room is quiet
- Allow the person to talk and ask questions
- Include the loved ones in the communication and instruction process.


**Fig. 3.7: Food service to elderly person**

**Food and Fluid Needs**

With the old age, food and nutritional needs also change. For example, as a person gets older, the calorie requirement in the body decreases. These needs are highest when the person was an infant or a teen.

Older patients and all age groups of old age require the least calories. They do not burn calories and food quickly. This does not mean that the elderly person does not need good nutrition. Older person also need good food just like other age groups.

As the human body ages, its appetite and digestion process slows down. The elderly person does not feel as hungry as he used to eat when he was young. Apart from this, whenever they eat food, they feel full of their abdomen and do not wish

to have a second meal for a long time. They can also skip a meals for a time. Elderly person always eat large amounts of small snacks instead of having three large meals a day. Liquid Fluid may be required in a condition of dehydration; an elderly patient may have trouble swallowing fluids. They may not feel thirsty even when in normal condition. For this reason, we should often give fluids or liquid diets to the elderly. The HHA should use apron and proper utensils for feeding the elderly patients.

**Requisite for better feeding during old age**

- Consistency of the food should be liquid to semi solid depending upon the chewing capacity of the old person.
- Light Food should be given in small quantity in 4-5 times a day.
- Food should be appealing and not much spicy or very much oily.
- Food from all food groups should be introduced in daily diet.
- Market based food or preserved food should never be given like as they are over loaded with chemicals and empty calorie food.
- Sprouted, Malted food have more readily available nutrient and are easy to digest, hence should be opted.
- An old person need more protein calorie calcium and other micro-nutrient to maintain muscle tear out with the ageing.
- Overfeeding or force full feeding should be avoided.
- Fruit juice, vegetable soup, mashed food, khichdi, halwa, stewed apple, custard. Egg yolk, idli, dhokla, muti grain sattu should be given as these are easy to digest and are nutrient dense food.
- Care taker or family persons need to patient and careful to avoid choking or aspiration.



## Activities

Visit a nearby hospital and observe the old age patients and write the safety related requirement and care rendered by HHA in the table given below:

| Safety related needs of Patient | Care rendered by HHA |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

## Check Your Progress

**A. Fill in the blanks**

1. The HHA is to provide safety, security, _____of the elderly people.
2. A good nutrition enhances _____and fights _____and reduces disease.

**B. Multiple choice questions**

1. According to Erikson, older adults want to share_____
   a) Their wisdom
   b) Maintain their sense of self
   c) Maintain integrity
   d) All the above
2. The old-age stage affects people
   a) Less thinking ability
   b) Less learning ability
   c) All a, b and d
   d) Less ability to understand

**C. Match the Column**

| Column A | Column B |
|---|---|
| 1. Strong Immune Strength | a. diet should be balanced with physical activity |
| 2. Mental Health | b. After the age of 40, our metabolism slows down |
| 3. Felling happy | c. mood and confidence increase |
| 4. Metabolism | d. omega-3 fatty acid foods |
| 5. Digestive food | e. A good nutrition |

**D. Short answer question**

1. Explain the security and safety needs of an elderly.
2. Explain the nutritional need of an elderly.
3. Write the role of HHA for better feeding required in old age.



## Session 5: Nutrition through Life Cycle

Healthy life is the most valuable treasure for any person and is a basic need. Health can only be achieved by proper diet and active lifestyle. Nutrition is required for growth and development of our body throughout life. Optimum nutrition is fundamental necessity for positive health and productivity. Understanding basic knowledge of nutrition and healthy dietary practice has now become essential for

getting proper nutrition and to prevent life-style disorders in this fast changing world. Nutrition plays an important part in healthy pregnancy, promoting healthy babies and children so that they grow up-to their best mental, physical, social and emotional potential. Poor diet during growing age causes retarded growth and malnutrition among children.


**Fig. 3.8: Nutrition is essential for growth and development**

**Balanced Diet**

A well-balanced diet comprise of all types of food in our plate from food-pyramid. Balanced diet provides adequate amount of nutrients to the body hence promotes health and prevents illness. Since different foods have various types of nutrients, we need to eat variety of foods. Food pyramid guides us to plan balance diet. Balanced diet can be achieved by the combination of four basic food groups in our plate. A balanced should have energy supply of around 50-60% from carbohydrate (complex carbohydrate), 10-15% from protein and 20-30% from fat (visible and invisible). Besides these nutrients, balanced should offer non-nutrients such as anti-oxidants and photochemical which imparts positive health effects. Nutrients are of seven types namely carbohydrate, protein, fat, fiber, mineral, vitamin and water. Nutrients are classified on the basis of their requirement amount in the body and are macro-nutrients and micro-nutrients. Nutrients are required in large quantity by the body known as macro-nutrients are carbohydrate, protein, fat, fibre and water. Micro-nutrients are vitamins and minerals which we need in trace or small amount.

The food guide pyramid has four levels of food group. Each food group supply distinctive nutrients. Groups of foods with same types of nutrients are placed together in food pyramid. No food group provides adequate amount of all nutrients alone therefore, intake of variety of foods from each group should be ensured. Food groups in guide pyramid have been categorized according to their recommended serving size per day which decreases when moving towards upper food group (Fig.1). Cereal and legumes placed at the base of pyramid should be consumed in

sufficient amount. Liberal inclusion of vegetables and fruits group on second level has been recommended in our diet. Milk, cheese, yogurt, meal, poultry, fish and egg should be taken up-to 2-3 serving per day. Minimal use of fats, oil and sugar has been suggested. Recommendation for regular physical activity and warning against smoking and alcohol consumption has also been mentioned


**Fig. 3.9: Food guide pyramid**

Food groups give us different types of nutrients

1. Grains cereals, millets: Carbohydrates Proteins
2. Fruits and vegetables: Minerals & Vitamins
3. Milk, yoghurt and cheese: Proteins and fat
4. Fats and oils : Fats
5. Fish poultry meat eggs and nuts: Proteins

**Recommended Dietary Allowances (RDA)**

Nutritional requirement varies from person to person depending upon gender, physical activity, height, weight, climate and physiological conditions as in pregnancy and lactation. RDA is the estimated amount of nutrients needed to maintain good health per day. RDA for all age group is different for every nutrient. RDA represents safe amount of nutrient to be taken for maintaining optimum level of nutrients and to prevent their deficiency in the body. National Institute of Nutrition (NIN) has given recommended dietary allowances (RDA) for healthy Indian population shown in Table 5.

**Table 5: Summary of Recommended Dietary Allowances (RDA) for Energy, Protein, Fat and Minerals for Indians – 2010**

| Group | Category/Age | Body Weight (Kg) | Net Energy (Kcal/d) | Protein (g/d) | Visible Fat (g/d) | Calcium (mg/d) | Iron (mg/d) | Zinc (mg/d) | Magnesium (mg/d) |
|---|---|---|---|---|---|---|---|---|---|
| Men | Sedentary work | 60 | 2320 | 60.0 | 25 | 600 | 17 | 12 | 340 |
| | Moderate work | | 2730 | | 30 | | | | |
| | Heavy work | | 3490 | | 40 | | | | |
| Women | Sedentary work | 55 | 1900 | 55 | 20 | 600 | 21 | 10 | 310 |
| | Moderate work | | 2230 | | 25 | | | | |
| | Heavy work | | 2850 | | 30 | | | | |
| | Pregnant | | + 350 | 78 | 30 | 1200 | 35 | 12 | |
| | Lactating 0-6 m | | + 600 | 74 | 30 | 1200 | 21 | | |
| | 6-12 m | | +520 | 68 | 30 | | | | |
| Infants | 0-6 months | 5.4 | 92 kcal/kg/d | 1.16 g/kg/d | - | 500 | 46 ug/kg/d | - | 30 |
| | 6-12 months | 8.4 | 80 kcal/kg/d | 1.69 g/kg/d | 19 | | 05 | - | 45 |
| Children | 1-3 years | 12.9 | 1060 | 16.7 | 17 | 600 | 09 | 5 | 50 |
| | 4-6 years | 18.0 | 1350 | 20.1 | 25 | | 13 | 7 | 70 |
| | 7-9 years | 25.1 | 1690 | 29.5 | 30 | | 16 | 8 | 100 |
| Boys | 10-12 years | 34.3 | 2190 | 39.9 | 35 | 800 | 21 | 9 | 120 |
| Girls | 10-12 years | 35.0 | 2010 | 40.4 | 35 | 800 | 27 | 9 | 160 |
| Boys | 13-15 years | 47.6 | 2750 | 54.3 | 45 | 800 | 32 | 11 | 165 |
| Girls | 13-15 years | 46.6 | 2330 | 51.9 | 40 | 800 | 27 | 11 | 210 |
| Boys | 16-17 years | 55.4 | 3020 | 61.5 | 50 | 800 | 28 | 12 | 195 |
| Girls | 16-17 years | 52.1 | 2440 | 55.5 | 35 | 800 | 26 | 12 | 235 |

**Nutritional Guidelines during old age**

Old age period is considered after the retirement or 60 year. Changes in taste and smell senses ability. Dental loss, decreased liver and biliary function occurs in old age. Decline in bone mineral density, renal function causes many nutritional problems. Old age person has weak bones, reduced digestives ability and loss of muscle mass. Physical inactiveness reduces the energy requirement during old age. Therefore, diet should be rich in nutrient from easily digestible food.

- Old age person needs extra additional calcium and vitamin D to maintain bone health. Hence, low fat milk, fish, green vegetables, fruits should be given.
- Vitamin D can be obtained with sufficient exposure to sunlight and deficiency of Vitamin B12 in vegetarian diet is always high, therefore fortified food, sea foods, and supplements should be considered.
- Adequate amount of salad, minced raw vegetable, fruits should be consumed for fibre to control blood glucose level.

- Whole grain bread, cereals, beans, sprouts should be included in the diet to tackle constipation and other ailments.
- Food low in salt, spices, fat should be consumed. Omega-3 fatty acid helps in reduction in risk of developing cardiovascular disease, loss of vision, poor digestion, inflammation and joint pains. Walnuts, flax seeds, sunflower oil, sesame seeds, soybean, fish liver oil.
- Plenty of water intake to prevent dehydration.
- Curd, butter milk, fruit juice ( for non-diabetic), fermented foods and malted food are generally nutritionally dense and are easy to digest. Therefore, flour of malted grains should be used to prepare snacks and for elderly family members.
- Due to loss in denture, semi-solid food or soft food can be given as in the form of grated vegetable, chutney, soups, upma, vegetable khicdi, idli, dhokla and sattu instead of chapattis.
- Tea and coffee should be given in limitation.
- Gas forming foods, like cauliflower, cabbage, spicy, fried, beans, raddish should be avoided.
- Light to moderate exercise is beneficial in prevention of decline physiological and neurological functions.

**Food and fluid need in elderly person**

| Food Group | g/portion | Type of Work | | | | | |
|---|---|---|---|---|---|---|---|
| | | Sedentary | | Moderate | | Heavy | |
| | | Man | Woman | Man | Woman | Man | Woman |
| | | No. of portions | | | | | |
| Cereals & millets | 30 | 12.5 | 9 | 15 | 11 | 20 | 16 |
| Pulses | 30 | 2.5 | 2 | 3 | 2.5 | 4 | 3 |
| Milk & milk products | 100 ml | 3 | 3 | 3 | 3 | 3 | 3 |
| Roots & tubers | 100 | 2 | 2 | 2 | 2 | 2 | 2 |
| Green leafy vegetables | 100 | 1 | 1 | 1 | 1 | 1 | 1 |
| Other vegetables | 100 | 2 | 2 | 2 | 2 | 2 | 2 |
| Fruits | 100 | 1 | 1 | 1 | 1 | 1 | 1 |
| Sugar | 5 | 4 | 4 | 6 | 6 | 11 | 9 |
| Fat | 5 | 5 | 4 | 6 | 5 | 8 | 6 |

## Activities

**Activity 1:** Visit a nearby hospital and prepare a diet plan for patient according to their disease condition some diseases are table given below:

| Patient disease | Dietary plan | | | |
|---|---|---|---|---|
| | Morning | Afternoon | Evening | Night |
| Diabetes mellitus | | | | |
| Anaemia | | | | |
| Hepatitis | | | | |

**Activity 2:** Prepare a chart of balanced diet for an adult that gives them energy as per their work:

| Food group/gram | Dietary plan | | |
|---|---|---|---|
| | **Sedentary** | **Moderate** | **Heavy** |
| | | | |
| | | | |
| | | | |
| | | | |

**Activity 3:** Go to the hospital and discuss with the dietician about the patient's diet plan.

## Check Your Progress

**A. Fill in the blanks**

1. Nutrition is required for _____of our body throughout life.
2. Food pyramid guides us to plan_____.
3. _____helps in reduction in risk of developing cardiovascular disease, loss of vision, poor digestion, inflammation and joint pains.

**B. Match the following food groups in column B. Provide us with different types of nutrients.**

| Column A (Food groups) | Column B (Nutrients) |
|---|---|
| 1. Grains cereals, millets | a) Proteins and fat |
| 2. Fruits and vegetables | b) Fat |
| 3. Milk, yoghurt and cheese | c) Protein |
| 4. Fats and oils | d) Carbohydrates Proteins |
| 5. Fish poultry meat eggs and nuts | e) Minerals & Vitamins |

**C. Writes full form**

1. RDA_____
2. NIN_____

**D. Short answer questions**

1. What is nutrition life cycle?
2. What are the daily grooming routines to be followed to make sure good health?
3. Write short notes on balance diet and food guide.
4. Explain nutritional guideline during old age.

## Session 6: Duties Of Home Health Aide

Home Health Aide (HHA) provides nursing and technical care to patients under the supervision of nurses in a hospital or nursing home care facility. Home Health Aide might spend more time with patients than other healthcare providers in a hospital or home. HHA should be sympathetic and have good communication and nursing skills to take care of patients in hospital or home.

**Essential Duties and Responsibilities**

The essential duties of a HHA include the following:

Assist professional healthcare staff with performing physical examinations and patient procedures; This can include measuring and recording the basic vital sign of life and also the measurement of input and output.

- Patient data, such as the record of vital signs and intake and output, are recorded according to the hospital's policy and procedure.
- Any changes and abnormal findings in the patient's diagnostic report or data are timely informed to the registered nurse and health team members.

**Fig. 3.10: Duties of home health aide**

**Techniques of Physical Examination**

**Physical Examination**

It is an systematic method of collect the health information about the patient general, physical, and mental condition of persons body. Examination of head to toe palpated and finds out the health problems in preliminary stage.

**Techniques**

Physical examination of four techniques. They are following during physical examination.

Inspection: It is first step of observing normal condition of patient. it is systematic observe and visualize the structure and function of human body. Like size, shape, redness, swelling and any abnormality in structure.

Palpation: It is second step of palpate by the hands and feels the body organs size, shape and position. In palpation used finger tips or finger pads palpated slowly pressed and examine soft tissue, peritoneum cavity and pelvis. Check the body temperature and pulse rate.

Percussion: It is the examination of chest and abdomen by tapping with fingers and determine the situation of internal organs by the sounds are produced. In which used one or both hands finger tips for the tapping. And produced sound is called percussion.

Auscultation: In which listening the sound they are generated by the internal body organs. Auscultation this sound is used mechanical device like stethoscope. Listening the heart and blood vessels, sound bowl sound in abdomen, lungs in auscultation breath sound.

- Patient is assisted with personal hygiene.
- Patient is given assistance with ADLs (Activities of Daily Living), exercise and ambulation as directed by therapists and other members of the healthcare team.
- Personal care and patient related services are provided in the patient's home as needed per guidelines set forth by the Home Health Agency.

**Maintain patient safety**

- Patient's environment including but not limited to the patient's room, exam room or treatment area is kept neat and clean.
- Food preparation and general housekeeping duties may be necessary in a home setting to maintain a safe environment.
- Meal preparation and light housekeeping duties may be necessary in the home setting to maintain a safe environment.
- Equipment maintenance and safety checks are completed according to their policy and procedure.

- Incidents are reported promptly to appropriate parties using the Health System's quality reporting process.

**Maintain necessary skills and competencies**

- Competency in the use of new equipment (i.e., lifting and moving patients) is achieved and maintained.
- Strengths and opportunities for professional development are identified and goals for self-improvement are set and documented appropriately.

## Activities

**Activity 1:** Prepare a presentation on the duties and responsibility of Home Health Aide in a Hospital.

**Activity 2:** Demonstrate the techniques of physical examination in school lab.

## Check Your Progress

**A. Fill in the blanks**

1. Home Health Aide (HHA) provides _____to patients under the supervision of nurses in a hospital.
2. A _____ provides support to doctors , nurses and other support staff to take personal care of the patient.
3. Appropriate effective communication using _____

**B. Multiple choice questions**

1. Equipment maintenance and supply check follows:
   a) HHA's rules
   b) Patient's decisions
   c) Policy based procedures
   d) None of the above

2. Duties and responsibilities of HHA include:
   a) Good inter personal skill
   b) Maintaining patient safety
   c) Assisting healthcare staff
   d) All the above

**C. Match the Following**

| Column A | Column B |
|---|---|
| 1. Patient care procedure | **a)** Medical record keeping/supply of inventory |
| 2. Administrative support<br>3. Functions | b) Productive work habits |
| 4. Organizational duties | c) Maintaining the patient's personal Hygiene |
| 5. Team work | d) Good interpersonal skill and managing customers |

**D. Write Short answer questions**

1. What are the role and functions of a Home Health Aide?
2. Write the organizational duties.

## Session 7: Care of Paralytic Immobile Patient

**Paralysis**

Paralysis is a loss of muscle function in part of your body. It can be localized or generalized, partial or complete, and temporary or permanent. Paralysis can affect any part of your body at any time in your life. Paralysis make it difficult or impossible to control muscles in the affected body parts.

**Types of Paralysis**

It can be categorized by physician or surgeon in the way mentioned below:

1. **Location:** When only one area of your body gets affected like face or hand it's called as Localized paralysis. When multiple parts get affected it called as generalized paralysis and below are the different types
   - Monoplegia, One arm or a leg gets affected
   - Hemiplegia, One arm or a leg of the same side of the body »» Paraplegia, influences both of your legs
   - Quadriplegia, or tetraplegia, both arms and legs are involved

2. **Severity:** In case of partial paralysis, you will be able to control the part partially in case of complete paralysis; you will lose complete control of the muscles

3. **Duration:** Sometimes paralysis can be temporary like in Bell's palsy condition which causes a temporary paralysis of face; same is the case with strokes which can momentarily paralyze one side of your body. In such cases changes of regaining complete or maximum consciousness of the muscle with treatment is possible

**Flaccid or spastic**

This shrinks and makes your muscles loose which further causes weakening of the muscle, majorly affecting tight and rigid muscles. Further this causes uncontrolled twitching or ripples.

**Causes of paralysis**

- Birth defects
- Cerebral palsy
- Severe medical illness
- Post-polio syndrome
- Traumatic injury to the brain
- Neurofibromatosis
- Spinal cord injury

**Diagnosed paralysis**

Diagnosis of paralysis is easy, in the case of muscle function loss. X-rays, CT scans, MRI scans, and other imaging studies are used to identify paralysis in internal body parts. Myelography is used to assess condition of the spinal cord injury. In this process, a special dye is inserted into your spinal cord to have clear visuals the affected nerves on X-rays.

Electromyography is another method doctor's use to measure electrical activity in muscles through sensors.

**Treatment**

Treatment plan depends on causes and symptoms of the patient and a specialist/doctor may prescribe:

- Surgery, maybe amputation
- Physiotherapy/occupational therapy
- Mobility aids like wheelchairs, braces, mobile scooters, etc.
- Botox or muscle relaxers in case of spastic paralysis

In case of incurable paralysis, a variety of treatments, tools and strategies are advised by the healthcare team to improve the quality of life.

**Outlook for paralysis persons**

Many cases, Paralytic patients never resume mobility in the affected areas. Only we can be modified Clothes, homes, car, and workplace by occupational therapists as per your needs.

**Patient care**

**Partially paralysed patients**

- In case of partial immobility, the patient should still be encouraged to do whatever he/she can in best of his/her ability.
- Consult an occupational therapist for recommendation of suitable equipment like toothbrush with long and thick hndle to make the patient more independent.

- If the patient shows resistance to usage of the new equipment, be patient until the patient gets used to it.
- This will help the patient gain confidence and respite to the care-giver. Physiotherapy or exercises should be practiced as many times a day to facilitate muscle movement, followed by an outing and breathing exercises

**Fig. 3.11: Patient care**

**Completely paralysed patients**

- More intensive care is required for bed-ridden patients. Thus a hospital bed is more important to raise or lower the patient.
- Such patients have to be turned every half or one hour, so that they don't get bedsores.
- Consult a specialist in case of redness, tenderness and pain. Ensure hygiene of bed sheets, toileting aids, utensils and moisturising agents.
- Empty urinary catheter or a drain bags frequently to avoid spillage and maintain hygiene.

**Medicine schedules**

- Adhere to medicine schedule.
- This is recommended for both semi and completely paralysed patients.
- Apart from regular medical needs, regular care should be kept in mind. For example, consulting a dietician about daily nutritional intake.
- Have some music running in the background as per the choice of the patient.

## Activities

Visit a nearby hospital and observe a paralysed patient and prepare a health care plan according to his / her needs.

| Partially Paralysed patients | Completely Paralysed patients |
|---|---|
| | |
| | |
| | |
| | |

## Check Your Progress

**A. Fill in the blanks**

1. Sometimes paralysis can be temporary like in _____condition
2. Only one area of your body gets affected it's called as_____.

**B. Multiple choice questions**

1. Which of the followings options are the causes of paralysis:
   a) Spinal injury
   b) Traumatic brain injury
   c) Birth defects
   d) All the above

2. The symptoms of immobile patients:
   a) Loss of muscle strength
   b) Neurofibromatosis
   c) Cerebral palsy
   d) Bulimia nervosa

3. Which of the followings are the conditions that require special and compassionate care:
   a) Diabetes
   b) Heart disease
   c) Paralysis
   d) All the above

**C. Short answer questions**

1. What is paralysis and write its causes?
2. Which method is used to diagnose paralysis?
3. What is impaired physical mobility?
4. Prepare a care plan for partially paralysed patient.

## Session 8: Assist the Physician in Physical Examination

The assistance provided by home health aide in various examinations of the patient viz. eyes, ears, nose, throat, neck, chest, etc.

**Physical examination**

This examination is done through a detailed study after inspecting the general, physical and mental condition of the patient's body. Through this examination, the initial state of the disease is detected in the patient's body and its diagnosis is done quickly. The HHA assists the physician during the examination of the patient.

**Some important stages of physical examination are**

1. Inspection
2. Palpation
3. Percussion
4. Auscultation

1. Inspection: Visual examination of the patient's body is usually called inspection. In this, the doctor performs a physical examination of the patient by looking at the symptoms of the disease, such as swelling, redness, weakness etc. This is the initial stage of physical examination.

2. Palpation: this method is felt with hands to the size and position of the body organs. Palpation is used to examine soft tissues, and organs of the abdomen and pelvis. It is also used to detect breast cancer.

3. Percussion: In this method, the body is tapped through the fingers and the position of the internal organs of the body is ascertained by the sound produced. This is mainly to investigate chest and abdominal problems.

4. Auscultation: Auscultation is a method of physical examination in which the disease is identified with the help of a stethoscope by hearing the sound of the internal organs of the body. In this method, the patient's circulation and respiratory system and digestive system are examined. For example, any heart related disorder changes the sound of the heart.

**HHA responsibility during physical examination**

The Home Health Aide should empty the patient's bladder and bowel before the examination. Change clothes and wear patient hospital attire. HHA is to provide patient good environment and should be adequate lighting and temperature in examination room, for physical examination use table and bed to provide patient comfort position. Use screen for patient privacy. HHA responsibility is to prepare a tray all sterile articles and equipments in use during patient's physical examination. HHA explain all procedure of examination to patient and her family members to reduse anxiety and mental stress. Home Health Aide duty should be permanently in the examination hall and assist the physician during the examination of the patient.

**General examination**

**Measuring Height and Weight**

To measure the length of the baby who cannot stand, the baby should be placed on a hard surface, in upright standing position with knees extended. The measurement of height is taken from the vertex of the head to feet of the soles. The head should be in such a position that the eyes are looking at the ceiling. A child's height can be easily measured after standing. If the person is wearing high-heeled shoes, ask them to remove it. If the person stands upright against the wall, a stadiometer tape is placed from the top of the head to the bottom of the foot, which will give an accurate measurement of the person's height. The weight of a person who can stand is generally measured by weight machine.

The patient stands on the platform provided and the weight is noted. Usually the weight is taken without shoes. To take the weight of a baby, a weighing scale with a container, where the baby can be laid, is used. The baby should be unclothed or the clothes should be weighed separately and subtract this weight.

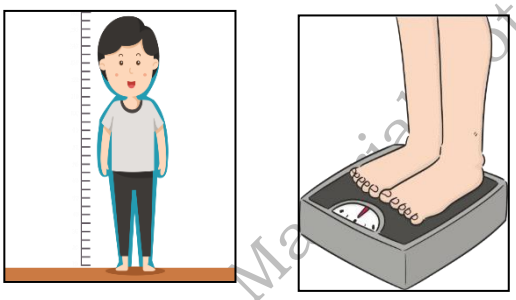


**Fig.3.12: Measuring height and weight of an patient**

**Measuring Skull Circumference**

The skull is measured from the top of the eye to the occipital protuberance where the diameter is maximum.

**Examination of Eyes**

The examination of eyes is done in a lying or sitting position. The examiner frequently uses a head mirror that reflects light to the patient's face. The first examination is to determine the movements of the eyes, reaction to light, accommodation to near and far objects. For detailed examination of the internal parts of the eye an ophthalmoscope is used.

**Fig. 3.14: Examination of eyes of an patient**
**Courtesy: https://goo.gl/t9CUn2**

**Examination of Ears**

The patient can either be recumbent or in the sitting position with the ear turned towards the examiner. The equipments used in examining the ear are head mirror, ear speculum of different sizes, cotton tipped applicators and oto-scope. Tuning fork test is the basic test for hearing. A child's ear needs to be examined very carefully and may be restrained if necessary. Younger children are asked to sit on their mother's lap and have their arms behind their backs between their mother's knees. The child head against the mother's chest. Small infants can be placed on examination table.

**Fig. 3.14: Examination of ears of an patient**
**Courtesy: https://goo.gl/t9CUn2**

**Examination of Nose, Throat and Mouth**

The patient is seated on the resting chair with his head back. Throat examination requires tongue depressor and good light. A nasal speculum and head mirror are needed for examining the nose. If require sometime use of stethoscope.

**Examination of Neck**

The neck is examined with the help of the finger is palpated and any abnormalities of the lymph nodes are examined. General examination of the thyroid glands, the patient is asked to swallow saliva. If we feel any symptoms of disease.

**Examination of Chest**

The patient is placed in a horizontal recumbent position to examine the anterior chest. There are various ways to examine the chest. Percussion method is used to check the collection of fluid or congested area. The doctor also uses stethoscope to check the sound within the chest. The patient is seated to examine the posterior of the chest.

**Fig. 3.15: Examination of chest of child**

The heart and lungs are check by percussion and auscultation method.

**Examination of Abdomen**

Abdominal examination is performed by placing the patient in a dorsal recumbent position and the knees are slightly bent to relax the abdominal muscles. The abdomen is inspected, palpated, auscultation, and percussion are inspected to detect any abnormalities.

**Examination of Extremities (Arm and Legs)**

Arms and legs are inspected, palpated and rotate in different directions. Edema can be seen in the ankle joint by pressing the skin against the bone and varicose veins of the back of the leg above the calf muscles. The joints are rotated in all directions to assess the movements.

**Examination of Spine**

The spine is examined for abnormal curvature by placing the patient in a standing position. The fingers are moved up the spine to detect spina bifida in the newborn infant.

**Examination of Rectum**

Examining the rectum and anus, the patient is placed in the dorsal-lying or left lateral position. The observe anus to diagnose problems such as bleeding, hemorrhoids, fissures. The patient is asked to bend down to examine internal hemorrhoids. Articles required during rectal examination are proctoscope, lubricant, cotton pad, good source of light (torch), a clean glove (one finger cot may sufficient).

## Activities

Visit a nearby hospital and observe the Doctor examining the following:

| **Patient Name:** ..... **Sex:** ..... **Age:** ..... | |
|---|---|
| **Particular** | **Observation** |
| Height | |
| Weight | |
| Eyes | |
| Ears | |
| Nose | |
| Throat | |
| Neck | |
| Chest | |
| Abdomen | |
| Arms | |
| Legs | |
| Spine | |

## Check Your Progress

**A. Fill in the blanks**

1. The measurement of _____is taken from the vertex of the head to feet of the soles
2. _____of the patient's body is usually called inspection.
3. The examination of eyes is done in a _____position.
4. Throat examination requires _____and good light.
5. Articles required during rectal examination are_____.

**B. Match the following**

| Examination of Organs | Equipment |
|---|---|
| 1. Ear | a) Stadiometer |
| 2. Nose | b) Ophthalmoscope |
| 3. Eye | c) Nasal speculum |
| 4. Measuring height | d) Otoscope |

**C. Answers the following questions**

1. What is the procedure for examination of eye of a patient.
2. Which techniques of physical assessment are used in human body examination?
3. What technique is used for chest examination?
4. Write the general examination of following.
   a. Ear b. Rectum c. Abdomen

## Session 9: Caring for Infants and Children

The Home Health Aide and other healthcare workers must know how to take care for babies and children. This care must meet the special needs of these age groups. HHA, nurses and many others get a lot of joy as they care for children but there are also a lot of challenges.

**The Age Groups**

Infants and children have many age related needs. These patients belong to one of these are groups:

- INFANTS- Birth to 1 year
- TODDLER- 1 to 3 years
- PRE-SCHOOL CHILD- 3 to 5 years
- SCHOOL CHILD- 5 to 12 years
- ADOLESCENT (TEENAGER)- 12 to 18 years

A new baby is an infant from the minute they are born until they have their 1st birthday. They are a toddler after their 1st birthday and until they are 3 years of age. These young children begin to walk and toddler around the house. From the age of 3 until 5, a child is in the pre-school age group. The young child has not yet started the first grade of school. From 5 to 12 years of age, the child is considered a school age child.

The last stage of childhood is adolescence. A boy or girl is a teenager, or adolescent, from 12 to 18 years of age. After the age of 18, the child is considered a young adult and able to make legal decisions of their own.

**Growth and Development of Children**

The Home Health Aide (HHA) and other healthcare providers must know about the major tasks for each of the age groups. A teenager's sense of self must be encouraged when they are in the hospital for a long period of time. When this age group is in the hospital they are not with their friends. Their group of friends helps them define who they are. Friends have become much more important to the teenager than their own family. Things that each age group must do are listed below for the infant, toddler, pre-school child, school age child and adolescent.

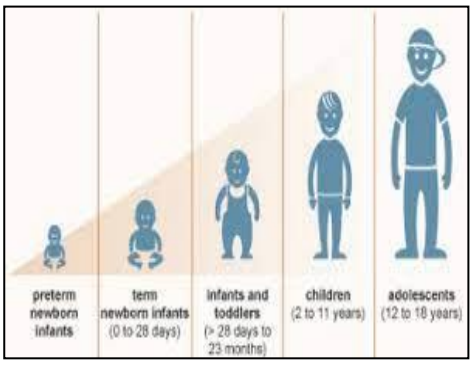



**Fig. 3.16: Growth and development**

- **Infants**- learn how to trust others. They are not yet able to do anything for themselves. They depend on others to feed them and to keep them safe. They need to be loved. They need others to keep them clean and dry. They must feel that their needs will be met as soon as they begin to cry.

- **Toddlers**- begin to take care of themselves and do things on their own. They learn to control themselves and what they do. They learn how to walk around, feed themselves, use the toilet and control their own behavior. This age group does not like to be frustrated. They also want to be with their parents. They do not like people that they do not know.

- **Pre-School Children**- start to act with a purpose and a goal. They begin to feel happy about what they can do. This age group is afraid of being punished and rejected.

- **School Age Children**- want to be confident. They want to do well in school. They try very hard to please their teachers and their parents. School age children want to feel that they are competent and able to do things on their own.

- **Adolescents or Teenagers**- want to be a part of a group. They need to have a sense of self and know who they are. They form their own identity when they belong to a group. Also, they often rebel against their parents.

**Keeping Children Safe**

Safety is one of the most basic human needs. Children have the greatest safety needs. For example, infants will put almost anything in their mouth, including poison and small things that they can choke on. We must, therefore, prevent poisoning and choking by keeping dangerous things away from infants and small children.

In addition to putting strange things in their mouth, infants and young children also do NOT know the difference between things that are safe and those that are not. They are very curious and they will try just about anything. They have little or no fear about getting hurt. It is our job to watch them very closely so they do not injure themselves while we are taking care of them in the home or in the hospital.

**Taking Care of Nutrition of Infants and Children**

Nutritional and hydration needs also change as a person ages. Infants need extra iron and the fats from whole milk, formula or breast milk. Infants get baby foods at about 4 to 6 months of age starting with cereal. New foods should be added slowly and ONE at a time so that new foods that cause problems can be identified right away.

Toddlers like to eat foods that they can pick up with their hands and eat. They start to use cups instead of bottles. They may even begin to use a spoon to feed themselves. Pre-school children start to decide what foods they like and dislike. They use a fork, knife and spoon to eat. Teenagers need extra calories, protein, calcium, iron, iodine and B complex vitamins for their growth. They often

do not get a good diet. They eat a lot of snacks and "fast food". They also do not stick to regular meal times. Many teenagers develop eating disorders that can lead to poor health.

Infants need frequent small feedings. They have to be kept warm with a blanket and proper clothing because their body is not yet able to control its own temperature. Infants can also become dehydrated very quickly, especially if they have diarrhea or vomiting. They have to be kept safe and away from infections because their body is not able to fight off infections as older children and adults can.

The vital signs of the infant, child and pre-teen/teen are different. The usual vital signs are as follows:

**Table 7: Normal ranges for vital signs**

| **Vital Sign** | **Infant** | **Child** | **Pre-Teen/Teen** |
|---|---|---|---|
| | **0 to 12 months** | **1 to 11 years** | **12 and up** |
| **Heart Rate** | 100 to 160 beats per minute (bpm) | 70 to 120 bpm | 60 to 100 bpm |
| **Respiration (breaths)** | **0 to 6 months** 30 to 60 breaths per minute (bpm) **6 to 12 months** 24 to 30 bpm | **1 to 5 years** 20 to 30 (bpm) **6 to 11 years** 12 to 20 bpm | 12 to 18 bpm[1] |
| **Blood Pressure (systolic/diastolic)[1]** | **0 to 6 months** 65 to 90/45 to 65 millimeters of mercury (mm Hg) **6 to 12 months** 80 to 100/55 to 65 mm Hg | 90 to 110/55 to 75 mm Hg | 110 to 135/65 to 85 mm Hg |
| **Temperature** | **All ages** 98.6 F (normal range is 97.4 F to 99.6 F) | **All ages** 98.6 F (normal range is 97.4 F to 99.6 F) | **All ages** 98.6 F (normal range is 97.4 F to 99.6 F) |

Infants must be held, cuddled and touched. The mother, father, sisters and brothers are the most important people to them. They do NOT want to be separated from them. They often cry when the parents are not seen. We should encourage the family members to stay with the infant and young children, whenever this is possible. We should also help the family to care for the sick infant or child.

Infants must NEVER be left alone unless they are in a safe crib with the side rails up. They should be placed on their back and WITHOUT any pillows when they sleep. Medications, small objects and other items that are not safe MUST be kept out of their reach. When the infant or young child leaves the hospital, a safe and approved car seat must be used.

**Taking Care of Teens**

The HHA Should Deal Very Cautiously And Carefully With the teenager. Some Specific Condition that the HHA may have to deal with, Includes the following:

Common Disorders in Adolescence:

- Abdominal pain
- Acne
- Anemia
- Anxiety
- Attention deficit hyperactivity disorder (ADHD)
- Breast discharge
- Breast masses
- Contraception
- Delayed/early onset of menses
- Depression
- Eating disorders, including anorexia nervosa and bulimia nervosa
- Endometriosis
- Excessive hair growth
- Fertility concerns
- Gynecomastia
- Headaches
- Hormonal problems
- Mental health counseling
- Menstrual problems
- Muscle strains and sprains
- Nutritional counseling
- Obesity
- Ovarian cysts
- Pelvic masses
- Pelvic pain
- Polycystic ovary syndrome
- Postural orthostatic hypotension
- Puberty questions
- Routine pelvic exams
- School problems (absences and performance)
- Sexual risk behaviors
- Sexually transmitted diseases
- Skin rashes
- Sleep problems
- Sore throats
- Sports injuries
- Transgender hormone therapy
- Urinary tract infections
- Upper respiratory infections
- Vaginal discharge
- Weight loss

Some examples of typical adolescent patients include:

- Teens that are unable to focus at school
- Teens who are not gaining weight or may have an eating disorder
- Teenagers have seen other experts on stomach pain problem and are not able to recover better.
- Teenagers are not going to school for two weeks due to fatigue and dizziness
- Adolescents who have some symptoms of depression or withdraw socially.
- Young adults who are experiencing increasing anxiety

Teens (adolescents) like to be their own person. Adolescence is a time of physical maturity and the teens develops powerful emotions and rapid changes in ways of thinking. Physical and emotional changes take place at this stage. They also face pressures at school and home, which complicate their health problems. They often rebel against their parents and other people in their life, like their school teachers. They often show anger. Sometimes, they break rules and laws.

Their friends are the most important group to them. They are not happy when they are not with their friends. This age group wants to look and dress nicely. They want to be liked by their group of friends. This gives them a sense of self. Healthcare providers must give them privacy and time with their friends.

## Activities

Write the special needs of child in the following age groups

| Age Group | Special Needs |
|---|---|
| Infant | |
| Toddlers | |
| Pre school children | |
| School age children | |
| Teen | |

## Check Your Progress

**A. Fill in the Blanks**

1. Infancy birth to _____ year
2. School child 5 to _____ years
3. Heart rate of infants ranges from 100 to _____ beats per minute
4. Respiration of infant ranges from 30 to _____ breaths per minute
5. Normal temperature range for all age groups in human beings is 97.4° F to _____°F

**B. Choose the right answer**

1. Heart rate of child
   a) 70 to 120 beats per minute
   b) 60 to 100 beats per minute
   c) 80 to 120 beats per minute
   d) 90 to 100 beats per minute

2. Respiration rate of infant 6 to 12 months
   a) ranges from 20 to 25 breaths per minute
   b) ranges from 18 to 20 breaths per minute
   c) ranges from 24 to 30 breaths per minute
   d) none of the above

3. Blood pressure (systolic/diastolic) of teens
   a) ranges from 130 to 135/65 to 85 mm Hg
   b) ranges from 110 to 135/65 to 85 mm Hg
   c) ranges from 120 to 135/65 to 85 mm Hg
   d) all the above

4. Pre-school child age
   a) 5 to 12 years
   b) 3 to 10 years
   c) 1 to 3 years
   d) 3 to 5 years

**C. Answer the following questions**

1. Explain the growth and development of children with age.
2. Safety of children is one of the most basic human needs, explain by example.
3. What kind of nutritional food do infants and children need as they age.
4. Write the common disorders in teenage.

| S. No. | Common Disorders in Teenage |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |

# Module 4 Prevention and Control of Infection in Home Setting

## Introduction

Disease causing microorganisms are present on every places related to healthcare setting. It is present on medical equipment, patient's body, food, medicines or samples and is acquired during hospital visits. It is hence necessary to follow safety measures to control spreading of diseases at home also. This unit details about the sterilization and disinfection procedures to be followed at home

In this session, you will learn about the types of disinfection, fumigation with sulphur and, management of isolation unit. You will also study good housekeeping practices and purpose of cleaning.

## Learning Outcomes

After completing this module, you will be able to:

- Describe the diseases caused by microorganism
- Demonstrate the knowledge of common human diseases and their causal agents
- Demonstrate the knowledge of process of disinfection
- Demonstrate the knowledge of care of articles
- Provide assistance in disinfection

## Module Structure

Session 1: Describe the Disease Causing Microorganism

Session 2: Causes of Common Human Diseases

Session 3: Methods of Disinfection

Session 4: Care of Articles

## Session 1: Describe the Disease Causing Microorganism

The microorganism causes diseases. A microorganism (from the Greek: mikrós, "small" and organismós, "organism") or a microbe is an organism that is microscopic (too small to be seen by the naked human eye). Microbes are studied in microbiology. This is a subject that started with the discovery of microorganisms using the microscope by Anton van Leeuwenhoek in 1675. A microbe, Which is another term for microorganism, a small individual living thing that cannot be seen by a human's open eye because it is very subtle. This small organism can only be seen using a microscope. This is why microbes are often called microscopic organisms. These microorganisms are found everywhere in the air, water, soil, rock, plants, animals and human body present here on earth. Factors of disease and causative microbes Microorganisms are very diverse. They include bacteria, fungi, archaea, and protists etc.

**Factors of disease and causative microbes**

Microorganisms are very diverse. They include bacteria, fungi, archaea, and protists, etc. Some microbiologists have also included viruses, but some consider them non-living. Most microorganisms are unicellular (single-cell), but this is not universally true, as some microorganisms are multicellular.

Microorganisms live in all parts of the biosphere including water, soil, springs, ocean, and air. Pathogenic germs are harmful because they invade the body and grow in the body of organisms causing harmful diseases that kill humans, animals and plants. Some germs can survive in very hot and high temperatures and some germs in extreme cold or low temperatures. Some microbes require oxygen and sunlight to grow and survive, and other microbes survive in the dark place and carbon dioxide. In the table below, a list of some microbes found in our body is given. The number of micro-organisms living inside and on our body is almost ten times more than the number of cells that make up our body shown in Table 8.

**Table 8: Microbes in Healthy Human Body**

| Microbes found in | |
|---|---|
| Ear (outer) | Aspergillus (fungus) |
| Skin | Candida (fungus) |
| Small Intestine | Clostridium |
| Intestine | Escherichia vaginails |
| Stomach | Lactobacillus |
| Urethra | Mycobacterium |
| Nose | Staphylococcus aureus |
| Eye | Staphylococcus epidermis |
| Mouth | Streptococcus salivarius |
| Large Intestine | Trichomonas hominis (protozoa) |

**What are disease causing micro-organisms?**

How many times we have been told to wash our hands before sitting down at the dining table or before taking food? By washing our hands with soap and water we clean our hands and make them microorganism-free. We take bath, cook, and even when we get cold and coughing, we cover our mouths to prevent the spread of infection by microbes (the disease causing microbes) that can make us sick. While some micro-organisms play an important role in keeping our daily life healthy. While some germs keep us healthy and play an important role, and others are bad, they are called disease causing germs and they are making humans, animals and plants sick by spreading infection and disease. Most microorganisms have four major groups: bacteria, viruses, protozoa or fungi.

**The disease-causing factor is called bacteria, germ or insect, Are responsible for the cause of infectious diseases. Bacteria (singular: bacterium)**

Bacteria are unicellular microorganisms. They are typically a few micrometers long and contain many shapes consisting of curved rods, spheres, rods and spirals. Bacteria are prokaryotic and unicellular beings. Bacteria have simple organization. They have an external cell wall, plasma membrane, circular Deoxyribonucleic Acid (DNA) within the cytoplasm and ribosome's for protein synthesis. The bacterial cell wall is made of peptidoglycans.

Bacteria are gram positive and gram negative and some bacteria are encapsulated in them. Bacteria are gram positive and gram negative and some bacteria are encapsulated. That is, their outer cell wall covering is a polysaccharide capsule. According to their necessity of oxygen, bacteria are classified into aerobic (they live and grow in the presence of oxygen) and anaerobic (they grow in the absence of oxygen). Obligate anaerobes are those living beings that do not growth in the presence of oxygen. For example, the bacteria Clostridium tetani, agent of tetanus, is an obligate anaerobes. In superficial wounds, it is common to use hydrogen peroxide to clean and kill anaerobic microorganisms for oxygen.

Binary fission leads to reproduction in bacteria. Some bacteria, however, present a type of sexual reproduction (transformation, transduction or conjugation) in combination with genetic material with different individuals. Sexual reproduction in bacteria occurs when Bacteria incorporate genetic material into a bacterium of the same species and the included genetic fragment again becomes part of the genetic material of another bacterium. Such reproduction can occur through transformation, transduction or conjugation.

Pathogenic bacteria have characteristics, known as virulence factors that help them parasitize their host. Some bacteria have structures such as fimbriae, cilium, and they help attached the bacterial cell to the host tissue. Intracellular parasites contain specialized bacteria. Other bacteria secrete toxins, molecules that cause

disease. There are also bacteria that cause diseases. Some disease are caused by bacteria in humans, they are as follows diphtheria, pertusis , tuberculosis, gonorrhea, syphilis, plague, leptospirosis, cholera, typhoid fever, trachoma, bacterial meningitis, tetanus, anthrax.

**Fungi**

Fungi are similar to plants made up of many cells. But they are not called plants because they cannot produce their own food through photosynthesis. Fungi are eukaryotic cell, so they have nucleus present. Bacteria are prokaryotic, meaning they do not have any true nucleus present. The study of fungi is called mycology. Viruses can not reproduce on their own, so they are sometimes just classified as infectious biological agents.

**Virus**

Viruses cannot reproduce on their own, so they are sometimes classified as infectious biological agents only. A virus (from the Latin noun virus, meaning toxin or poison) is a sub-microscopic particle (ranging in size from 20–300 nm) that can infect the cells of a biological organism. The outer layer of the virus may be spiny. it is like an envelope. The virus has a core of genetic material, but there is no way to reproduce it by itself. Viruses infect cells and handle their reproductive system to reproduce.

The viral disease is spread by respiratory secretions or droplets of sneezes, cough and saliva are flu, mumps and smallpox (variola is already eradicate), mumps, measles, rubella, corona, SARS (severe acute respiratory syndrome). The cause of spreading viral disease is infected blood or multiple sexual contact are (AIDS) Acquired Immune Deficiency Syndrome, hepatitis B and C, (HPV)Human Papillomavirus, Ebola hemorrhagic fever. Some viral diseases like rabies, dengue fever, yellow fever etc. are transmitted through animals. And some viral diseases spread through the fecal-oral route, including contaminated food,hepatitis A.

Flu is a communicable viral disease caused by influenza virus and this is a highly mutant DNA virus. Due to the high mutation rate of the virus, they produces many different strains, Flu-affected populations always present epidemiological features and people may have multiple flu episodes during life.

Rabies is a viral disease also known as hydrophobia. The virus is found in the saliva of dogs, cats and other wild mammals; in humans, this transmission occurs through the animal's contaminated saliva, mainly by bites. The symptom of this disease is that humans are afraid of water.

Smallpox is a viral infection caused by measles virus. Smallpox is transmitted through contact with infected respiratory secretions, contaminated saliva or objects and infected persons. Signs and symptoms of the disease are the presence of several vesicles on the skin of the face, trunk and limbs that can secrete pus and create scars and scab, which can lead to the death of a person. Measles is transmitted by saliva drops and respiratory secretions too.

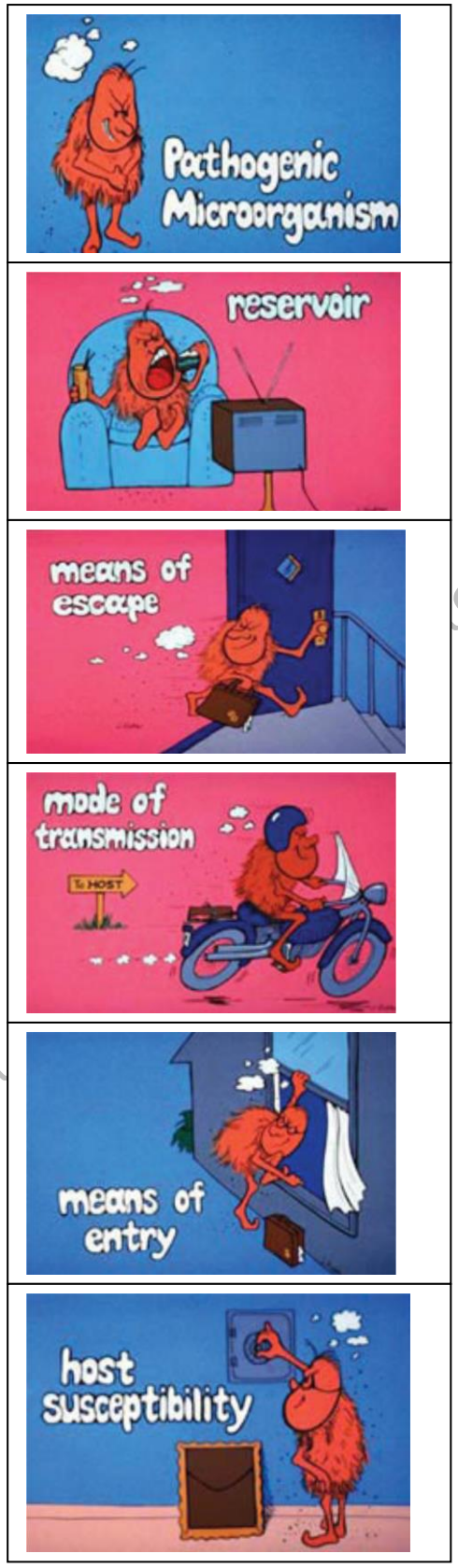



**Fig. 4.1: Cause of disease**

Bacteria, fungi and viruses are all very different from one another. One major difference is which cell coating is around their cell. Bacterial cell walls are made up of peptidoglycan, fungal cell walls are made of chitin, and the virus coats proteins around their genetic material. Bacteria and fungi are all very small, requiring a microscope to see them.
All bacteria and viruses act as a single cell, whereas fungi can be unicellular or multicellular. Bacteria colonize large numbers of individuals, whereas viruses do not usually occur in colonized areas, as they cannot reproduce on their own.

**Parasite**
A parasite is an organism that depends on another living organism and survives, known as the host. This means that the host basically feeds a parasite and the host consequently becomes ill. Parasites can be as small as viruses and as large as one meter-long tapeworm.

**Microbes – the ones that make us sick**
Microorganism – which make a person sick and infected Pathogens are organisms that cause disease. They are frequently, but not necessarily micro-organisms. If an organism is pathogenic, it depends on the species it is in contact with. Not all microbes are unicellular and not all microorganisms cause diseases. Many microbes live in or around animals or plants that appear to be without harm. Indeed, in many cases the association is beneficial for both, known as symbiosis, for example, cellulose digested bacteria in the rumen of cattle.

It is important to note that:
- A pathogen is a microbe that has the potential to infect or disease a healthy person.
- An infection is the invasion and multiplication of germs that cause disease in a person's body.
- Disease occurs when microbes damage a person's physical functions and system.
- An infection does not always result in disease.

Worldwide, the number of people dying from infectious diseases is higher than other diseases. Microbes can quickly develop new features that make them resistant to the drugs that were once able to kill them.

The effects of infection by pathogenic bacteria are also changes and may include the following:
- Fever
- Inflammation
- Antibody synthesis
- Shock (only in extreme cases)
- Impaired blood clotting (only in extreme cases)

Some infectious disease caused by bacteria gonorrhea, pneumonia, tetanus, whooping cough, meningitis, and tonsillitis.

**How do Microbes Infect?**

How do we actually become infected with disease-causing microorganisms? Every day, we come in contact with people or animals that can be infected with microorganisms that cause disease. Due to which we are at risk of getting disease or infected. Disease- causing microorganism use very easy or simple methods to enter our body so that they can cause disease. These germs have developed the ability to dodge the human immune system and get past the body's defense system, just like a thief enters the house by breaking the lock at the door or enters through the window.

Being infected depends on the link between the environment, the host - the host being you or I. The transition method can be thought of as six separate steps that all combine together to form a spherical chain, as shown in the figure below.

The process of infection begins with the microbes that cause the disease. This is the first link of the chain. The second link is the reservoir, the environment where the pathogen can survive. For example reservoir, water, soil and someone who is already infected with microbes.

A third link is formed when there is a way out of the reservoir. If we are a reservoir, pathogenic microorganisms can spread if we cough or sneeze. The fourth link of the series is the mode of transmitting from the reservoir to the host. If water is a reservoir, the transmission of microbes can occur through our drinking water supply.

To infect a human, germs have to find a way to enter the host's body. When we drink contaminated water, pathogens present in that water enter our body. Some pathogens which are present in the air enter the body through our respiratory tract. The final link of the series is how the host is susceptible to infection. Depending on the disease caused by the germ, some hosts will be easier to infect quickly than others. The final link of the chain is how susceptible the host is to infection. Depending on the germ and the disease it causes, some hosts will be easier to infect than others.

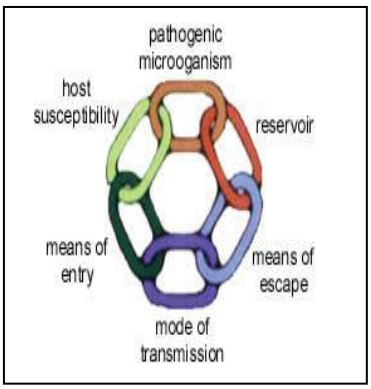



**Fig. 4.2: The chain of the infection**

For the purpose of a contamination, germs must enter our body. The path through which they enter our bodies is known as the portal of entry. There are four major portal of entry:-

- Respiratory route (mouth and nose) e.g. Influenza virus, which reasons the flu
- Gastrointestinal route(mouth, oral cavity) e.g. Vibrio cholera which causes cholera
- Urogenital tract e.g. Escherichia coli, which causes cystitis
- Skin pores and surface route e.g. Clostridium tetani which causes tetanus

To make the host ill, microbes must enter the body and do the following:

- They reach their specific target site in the human body such as the corona virus affecting our respiratory system
- multiply rapidly
- rapid reproductive growth in the body
- Get their nutrients from the host
- Avoid and attack by the host immune system
- reach their target site in the body
- attach to the target site they are trying to infect so that they are not dislodged
- multiply rapidly
- obtain their nutrients from the host
- avoid and survive attack by the host's immune system.

**The Epidemiological Triangle**

The word epidemiology comes from three Greek root words: Epi—means "on, upon, befall", Demo—means "people", -logy—means "the study of". So epidemiology literally means "epidemiology is the study of distribution and determination of disease frequency in human". The epidemiology is the triangular model that scientists have developed to understand communicable diseases and how they spread. There are other factors related to the host and the environment, which are equally important to determine whether a host will have disease or not.

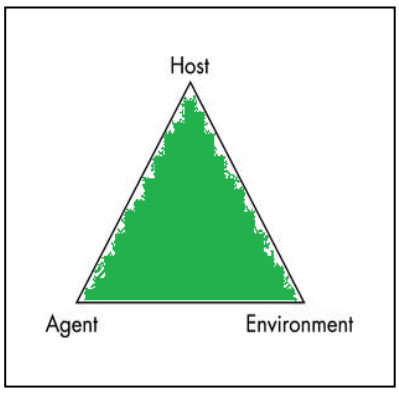



**Fig. 4.3: Epidemiological Triad**

The triangle has three vertices, with agent, host and environment.

1. **The Agent**: The agent or microbe that causes the disease (the "what" of the Triangle) is the cause of the disease. While studying the epidemiology of most infectious diseases, the agent is a microbe.

2. **The Host:** Hosts or organism harbouring the disease (the "who" of the Triangle) are organisms, usually humans or animals, which are exposed to and harbour a disease. The host may be the organism that becomes ill, as well as any animal carrier (including insects and worms) that may or may not become ill. Although the host may find that he has developed the disease or is seeing any external symptoms of the disease, he still takes the disease from the host. The title "host" also includes symptoms of the disease. Different individuals may have different reactions in the same microbe.

3. **The Environment:** Elements outside the environment that allow purpose or disease transmission (the where of the triangle) are favorable environments and conditions outside the host that allow the cause or disease to be transmitted.

## Activities

1. Visit a nearby hospital and discuss with the medical professionals about the common causes of diseases.
2. Visit a microbiology lab in a nearby hospital and study the following:
   - Bacteria, Viruses, Protozoa and Fungi
   - Pathogens and microbes

## Check Your Progress

**A. Fill in the Blanks**

1. The discovery of microorganisms using a microscope in 1675 by_____.
2. The bacterial cell wall is made of_____.
3. Fungi are not called plants because they cannot produce their own food through _____
4. A parasite is an organism that depends on another _____and survives, known as the host.
5. the three vertices of the epidemiological triangle are the agent, host and.....

**B. Write the following microorganism in the given box below.**

| S. No. | Microbes | Name of Microorganism |
|---|---|---|
| 1 | Bacteria | |
| 2 | Virus | |
| 3 | Fungi | |

**C. Answer the following questions**

1. What is microorganism?
2. Write the factors of disease and causative microbes.
3. Write a short note on epidemiology.
4. What are the three vertices of the epidemiological triangle.

## Session 2: Causes of Common Human Diseases

The common diseases of human beings and their causal agents. There are several definitions to define the disease. According to Webster's dictionary define disease "a condition in which body health is impaired, a departure from a state of health, an alteration of the human body interrupting the performance of vital functions. The Oxford English Dictionary defines disease as the state of the body or any part or organs of the body in which its functions are obstructed or distorted."

**Causative agents in various human diseases**

A disease is a particular all of an organism abnormal, pathological condition that affects all part or whole body. Illness and sickness are mainly used as synonym for disease. A disease is associated with specific symptoms and signs. A distinction is also made between the term disease, illness and sickness which is not completely synonymous. The term "disease" Sickness "refers not only to the presence of a specific disease, but also to the person's perceptions and behavior in response to the disease, as well as the effect of that disease on the psychosocial environment. "Sickness" refers to a state of social dysfunction. Contamination by signs and symptoms is easy to determine, although in many diseases the boundary line between everyday and ordinary is unclear in the case of diabetes, hypertension, and intellectual contamination. The stop-point or end result of disorganization is variable recurrence, disability, or death of the host.

**Infectious disease**

Infectious disease is a communicable disease that is caused by microbes that spread. There are many diseases including common cold and flu (influenza) that are infectious in nature. Infectious diseases are caused by microbes and are very subtle, which cannot be seen with the naked eye. The common infectious disease

is caused by bacteria, virus, protozoa, fungi (a type of parasite). The transmission of communicable disease reaches another person through cough, sneeze, flu, contaminated sputum, droplet infection and infected person. Sometimes the disease spreads through another medium, for example contaminated water and food. New strain is beginning to develop in infectious diseases that resist old medical treatments.

**Common Human Diseases**

- Athlete's Foot: a contagious fungal foot infection that causes the feet to itch, blister and crack.
  - Autoimmune disease: This is a condition when the immune system accidentally attacks the cells, tissues and organs of your body. The immune system protects against communicable diseases such as bacteria, viruses, germs.
  - Cancer: any harmful growth or tumor due to irregular and uncontrolled cell division; It can spread to other parts and organs of the body through the lymphatic system or through the blood stream. There are two types of malignant and benign.

| Malignant | Benign |
|---|---|
| It is fast growing | Benign is slow growing |
| Non capsulated | Capsulated |
| Invasive | Non invasive |

  - Chickenpox: It is a highly communicable viral infectious disease that is a sign of mild fever and rash, caused by the (VZV) varicella zoster virus.
  - Cholera: Cholera is an extremely acute short-term infectious disease of the small intestine caused by the bacterium Vibrio cholera. In which a person causes vomiting, persistent watery diarrhea, severe dehydration, muscle cramps, weakness and fever.
  - Coronary artery disease: cholesterol formation inner layer of the arteries.
  - Chronic lung disease: a long term illness that affects the function of the lungs.
  - Hepatitis A: : It is a liver infection disease caused by Hepatovirus – A, that usually spread by eating contaminated food and drinking water. These sign and symptoms are diarrhea, vomiting, weakness, jaundice, abdominal pain and fever.
  - Hepatitis B: It is a viral infectious disease caused by the Hepatitis-B virus HBV which causes irritation and inflammation in the liver. It spreads directly from the blood of a contaminated person or through contact with body fluids such as saliva, semen, vaginal fluids.
  - Hepatitis C: is an infectious disease of the liver it is caused by hepatitis –C virus HCV that is usually spread by blood and blood products and sometimes through sexual contact.

- Malaria: is an infectious disease caused by the bite of the female Anopheles mosquito in humans. It is always a carrier of malaria parasite, it affects red blood cells, and symptoms of malaria include chills, high fever, and sweating.
- Measles: It is a highly acute infectious disease that is caused by the measles virus, it mainly occurs in children as its symptoms are fever, red spots on the skin and swelling on the airways of the head and throat.
- Meningitis: : It is an inflammation of the fluid and membranes surrounding the brain and spinal cord, which covers the brain and spinal cord. Bacterial meningitis or viral meningitis caused by bacteria or viruses. Its symptoms are fever, vomiting, intense headache and stiff neck.
- Multiple sclerosis: An autoimmune disease, also known as encephalomyelitis dysmenata, affects our central nervous system, in which the insulating covers of the brain, spinal cord, and optic nerve cells are damaged. There by inhibiting the ability of parts of the nervous system to transmit nerve signals. As a result of which signs and symptoms of the disease are seen such as those related to physical, mental diseases.
- Pneumonia: Pneumonia is an acute or chronic lung inflammatory disease, these is primarily affects our lung air sac (alveoli). The symptoms of pneumonia are usually cough, fever, chest pain and difficulty in breathing. And it occurs mainly in small children.
- Polio: A viral infection caused by polio virus that attacks nerve cells, which affects the muscles, brain, and spinal cord and causes paralysis of the lower extremities of the human body.
- Rabies: It is a highly acute, contagious and fatal disease that affects our central nervous system (brain and spinal nerves). And it occurs in humans through the bite of an infected animal.
- Shingles: A disease in adults caused by the same virus causing chickenpox in children. This causes inflammation of the spinal cord and cranial sensory nerve cells resulting in blisters or ulcers that will appear along the affected nerve tract. It usually affects only one side of the body and causes sudden, severe pain attacks.
- Sinusitis: inflammation and swelling of the mucous membrane or sinuses, especially in the nasal cavity.
- Strep Throat: a throat infection that causes disphagia, fever, and inflammation of the tonsils.
- Tuberculosis: It is a highly contagious disease caused by the Mycobacterium tuberculosis. In this disease, tubercle is formed on lungs and other tissues of the body and this tubercle is a nodule or inflammation. Specifically a mass of lymphocytes (white blood cells) and epithelial cells (cells resembling epithelium) that form tuberculosis lesions.
- Typhoid fever: It is an acute infectious disease caused by Bacteria salmonella typhi due to consumption of contaminated water and food. Its symptoms are as headache, high fever, cough, bleeding from intestine, pink colored spots on the skin.

- Urinary tract infection (UTI): an infection of any organ (kidneys, ureters, urethra) of the renal system ( the path involved in the formation and excretion of urine.
- Whooping cough: It is a bacterial infectious disease caused by Bordetella pertussis. The symptoms of which are in the form of low fever, runny nose, persistent cough, swelling of the eye membrane, chest pain. Use pertussis vaccinations that prevent coughing.
- Yellow fever: A infectious tropical disease passed by mosquitoes. Symptoms from this disease will be high fever, yellowing of the skin, black vomiting, incontinence of urine, and bleeding in the digestive system.

## Activities

**Activity 1:**Visit a hospital and discuss with the doctors about the common human diseases and their source of infection. Also take notes of the measures adopted by the hospital to prevent and avoid the spread of diseases.
**Activity 2:**Visit a nearby hospital laboratory and write down the various instruments/ chemicals used in testing the following in the table given below:

| Microbes | Instruments / Chemical used |
|---|---|
| Bacteria | |
| Virus | |
| Fungi | |
| Parasites | |

## Check Your Progress

**A. Fill in the Blanks**

1. A disease is an abnormal pathological condition associated with specific _____ or _____.
2. _____ are problems noticed by a patient, while _____ are objectively detected and measured by the concerned physician.
3. Infectious diseases are caused by _____ that spreads the diseases.
4. Pneumonia is an acute or chronic lung_____.
5. Polio is causes paralysis of the _____ of the human body.

**B. Match the column**

| Column A (Disease) | Column B (Causal agent) |
|---|---|
| 1. Malaria | a) Mycobacterium tubercle |
| 2. Hepatitis | b) Polio virus |
| 3. Tuberculosis | c) Bordetella pertussis |
| 4. Polio | d) Female anapheles mosquitoes |
| 5. Whooping cough | e) Hepatitis B virus |

**C. Choose the following correct answer**

1. Contaminated water and food borne disease is
   a) Yello fever
   b) Typhoid fever
   c) Malaria
   d) Hepatitis

2. Chickenpox is caused by
   a) varicella zoster virus
   b) Salmonella typhi,
   c) Polio virus,
   d) Hepatitis B virus

3. Hepatitis mainly affects which part of the human body
   a) spleen
   b) Kidney
   c) Stomach
   d) Liver

4. Rabies affects which system of our body.....
   a) Digestive system
   b) Respiratory system
   c) Central nervous system
   d) Cardiac system

**D. Answer the following questions**

1. Write any four diseases caused by bacteria that make humans sick?
2. List any six diseases caused by viruses?
3. List any two human diseases caused by fungi?

# Session 3: Methods of Disinfection

Microorganisms are present everywhere. Since they cause infection, contamination and disease, and spread the disease, it is necessary to remove and destroy contaminated material or biomedical waste from hospital areas. There are various measures are adopted to prevent the spread of microorganisms in the hospital. Therefore, good housekeeping is the first priority and also most important in the hospital. It is the responsibility to provide safe, clean and orderly environment to all the personnel in a hospital. Every patient has the right to be protected from the Hospital Acquired Infections.

In order to ensure that the patients are protected from HAIs, various procedures and practices are adopted which include cleaning, sterilization and disinfection using physical, chemical and other methods. In this session, you will learn about the various agents, machines, equipment and methods adopted by the medical staff in disinfecting ward and equipment.
Let us first try to understand the meaning of some of the common medical terms, such as cleaning, sterilization and disinfection used in prevention and control of microorganisms.

**Cleaning**
Cleaning plays an important preparatory role before sterilization or disinfection. Cleaning helps in removing soil and other dirt and reducing the microbial burden, making sterilization more effective.

**Fig. 4.4: Cleaning**

The various equipment that used for cleaning include, but are not limited to, the following:

- Floor cleaning machines
- Swiping machines
- Floor scrubbing machines
- Floor polishing machines
- High pressure machines to clean bathrooms

**Daily cleaning:** This includes sweeping and mopping floors, dusting furniture, walls, ceilings, windows and bathrooms, emptying garbage, etc.

**Periodic Cleaning:** This includes washing windows, using chemical for flooring, cleaning carpets, clean dusting the high ceilings and replacing draper, sheets, pillow covers and curtains.

**Discharge cleaning**: This includes cleaning the patient's room after discharging the patient or shifting (transfer) the patient from one place to another to prepare the room for the patient to be admitted.

**Exterminating bugs and pests:** Hospital's Integrated Pest Management (IPM) plans help direct a hospital in carrying out its pest control practices regularly. An IPM programme is a pest management approach to preventing and managing pest problems in the least hazardous manner possible. It emphasizes on pest prevention through good sanitation practices and maintaining structures in optimum repair. Pesticides are used only when needed, primarily in baits. Records are kept of all pesticide applications. The hospital should utilize the services of a certified license pesticides control agency. All hospital staff should be educated about the hazards of pesticides and the advantages and principles of IPM. Prior notification of pesticide use in the hospital should be done well in advance and all precautions should be taken.

**Trash and garbage removal**: Waste generated from the hospital has to be carefully disposed of as per the guidelines issues by the government. The hospital generates various types of waste, but they are not limited to the following:

a) **Solid waste –** This waste is also called municipal waste or non-regulated medical waste. This is general trash, similar to what you would find in a hotel but with more plastics and packaging.

b) **Regulated Medical Waste (RMW) –** This waste stream is also known as potentially contaminated material, red bag waste or bio hazards waste.

c) **Pharmaceutical Waste –** Some pharmaceutical waste is considered hazardous while a large majority may not require handling as hazardous waste, but should receive special disposal considerations, including controlled substances.

d) **Universal Waste –** Universal waste includes pesticides, mercury-containing equipment, batteries,bulbs (lamps), electronic waste, and more.

e) **Recyclables –** Recyclables are items and materials connected to the waste stream that can be converted again into useful material once used. Recycling in healthcare includes common suspects found in commercial buildings such as paper, cardboard, beverage and food containers, metal and glass.

**Sterilization:** Sterilization is the process in which all articles and apparatus surface or medium are free from all living microorganisms, for example autoclaving, sterilizer.

**Disinfection:** Disinfection means destroying and reducing the growth of a pathogenic organism, it uses disinfectant chemicals for cleansing.
This is the freeing of an article from some living organisms and is used in conditions where sterilization is not needed, e.g., disinfection of bed-pans, wash basins, furniture, eating utensils and clothes. A perfect disinfectant will also offer complete sterilization, being inexpensive and non-corrosive, without harming other forms of life.

**Antisepsis:** Antisepsis is used to generally indicate the prevention of infection, which usually inhibits the growth and multiplication of bacteria in a wound or tissue. Chemical disinfectants can be used safely on the skin or mucous membranes to clean wounds, and are used to prevent infection and inhibiting bacterial growth, known as antiseptics.
Antisepsis is used to indicate the prevention of infection, usually by inhibiting the growth of bacteria in wounds or tissue. Chemical disinfectants which can be safely applied on the skin or mucous membrane and are used to prevent infections by inhibiting the growth of bacteria are called antiseptics.

**Decontamination:** This is refers to the process of freeing an article or area free of danger and contaminants, such as microbes or chemical, radioactive and other hazards. Decontamination refers to the process of rendering an article or area free of danger from contaminants, including microbial, chemical, radioactive and other hazards.

**Table 9: Difference between Antiseptics and Disinfectants**

| Antiseptics | Disinfectants |
|---|---|
| • Use on skin and mucous membrane to kill microorganisms<br>• Not for use of inanimate objects | • Use to kill microorgansim on inanimate objects<br>• Not for the use on skin and mucous membrane |

**Properties of an Ideal Disinfectant**

The properties of an ideal disinfectant include the following:
- Resistant to inactivity
- Highly active in killing the pathogen
- Non-poisonous
- Penetrating to pathogens
- Not damaging to non-living materials
- Stable
- Easy to work with and not unpleasant

The various agents used in sterilization can be classified as follows:
A. Physical agents
  - Sunlight, Drying
  - Dry heat: flaming, incineration, hot air

- Moist heat: pasteurization, boiling, steam under normal pressure, steam under pressure
- Filtration: candles, asbestos pads, membranes
- Radiation
- Ultrasonic and sonic vibrations

B. Chemical

- Alcohols: ethyl, isopropyl, trichlorobutanol
- Aldehydes: formaldehyde, glutaraldehyde
- Dyes, Halogens and Phenols
- Surface – active agents
- Metallic salts: e.g. salts of Ag, Cu, Hi
- Gases: ethylene oxide, formaldehyde, beta propiolactone


**Fig. 4.5: Use chemicals for disinfection**



**Effectiveness of Antimicrobial Agent Activity**

The destruction of microorganism and inhibiting microbial growth are not simple cases because the efficiency of an antimicrobial agent (an agent that kills microorganisms or inhibits their growth) is affected by at least six factors.

**1. Population Size:** Because an equal fraction of a microbial population is killed during each interval, a larger population requires more time to die than a smaller one. The same principle applies to chemical antimicrobial agents.

**2. Population Composition:** The effectiveness of an agent varies greatly with the nature of organisms, as microorganisms differ markedly in susceptibility. Bacterial endospores are most resistant to antimicrobial agents compared to vegetative forms, and young cells are usually more easily destroyed than mature organisms. Some species are able to withstand better conditions than others. Mycobacterium tuberculosis, which causes tuberculosis, is more resistant to antimicrobial agents than most other bacteria.

**3. Concentration / Intensity of an Antimicrobial Agent:** Often, but not always, the more concentrated a chemical Concentration / intensity of an antimicrobial agent: Often, but not always, the more concentrated a chemical agent is or intensifies a physical agent, the faster the microorganisms are destroyed. Sometimes an agent is more effective at lower concentrations. For example, 70% ethanol is more effective than 95% ethanol.

**4. Exposure Time:** The more often the population of microorganisms comes in contact with the microbiocidal agent, the more pathogenic organisms are destroyed or killed.

**5. Temperature:** An increase in temperature that increase the activity of a chemical and its function. Low concentrations of disinfectants or sterilizing agents may be used at high temperatures.

**6. Local environment:** environmental factor is organic material that can protect micro-organisms from being destroyed by heating and chemical disinfectants. It may be necessary to clean an object before it is disinfected or sterilized. All surgical and medical or dental equipment must be thoroughly cleaned before processing sterilization as the presence of more organic material can protect pathogens or microbes and increase the risk of infection. For example, to make water drinkable, it is cleaned and the pathogens are destroyed. In the same way, if we supply water on a large scale, then there is an excessive amount of organic matter in it, then to clean and disinfect it, a large amount of chlorine is added to it and clean and disinfected water is supplied in the city.

Antimicrobial and antiseptics or disinfectants mode of action
The disinfectants and antiseptics acts in the following ways:

1. Denaturation of bacterial protiens by by inhibiting hydrogen and disulfide bond (for example phenol in high concentration, alcohol, heavy metal in high concentration, acids, alkalis, aldehydes).
2. Damages to the bacterial membrane (lipid or proteins) It causes leakage of intracellular molecules. (for example phenol in low concentration, surfactants, dyes).
3. Interruption of bacterial enzyme and metabolism (for example oxidants, heavy metals in low conc., alkylating agents).

**Uses**

- To sterilize culture media, rubber goods, gowns, dressing material, gloves, etc.
- This is particularly useful for articles or equipments that can withstand the high temperatures of hot-air ovens.

**Process of Fumigation with Sulphur and formalin**

The entire room should be filled with steam by boiling water in a kettle because the fume of sulfur works better on the moist surface. A small room of 100◦C feet requires about 220 grams of sulfur for fumigation, which is placed in an earthen pot in a large oven containing water. A small amount of methylated spirit is poured over the sulfur for complete burning of sulfur. The door must be completely closed after a fire in sulfur. And the room is opened 24 hours later. In this process the door is opened after 24 hours. This effectiveness depends on many factors Such as room temperature, exposure time and humidity, gaseous concentration. All articles and equipments must be kept open for complete penetration by sulfur fumes. This fumigation process occurs in the operation theater or the room of an infected patient, which completely destroys the pathogenic germ.

## Activities

**Activity 1:** Visit a nearby hospital and prepare a write-up on the various methods of sterilization and disinfection. Study the various equipment, chemicals and procedures used by the hospital.

**Activity 2:** Visit a nearby hospital and observe the use of following chemicals. Write any two use of each chemical given in the table below:

| Chemical | Use |
|---|---|
| Chlorine | 1<br>2 |
| Phenol | 1<br>2 |
| Alcohol | 1<br>2 |
| Hydrogen Peroxide | 1<br>2 |
| Sulphur | 1<br>2 |

**Activity 3:**Students will demonstrate the process of fumigation in the classroom.

## Check Your Progress

**A. Fill in the blanks**

1. _____is used on skin and mucous membrane to kill microorganisms.
2. A small room of 100oC feet requires about _____for fumigation.
3. _____ plays an important role before sterilization or disinfection.
4. Disinfection means destroying and reducing the growth of a _____.
5. _____ is the process by which an article, surface or medium is freed of all living microorganisms.

**C. Write the following questions answer -**

1. What is cleaning?
2. Write and classify the various agents used in sterilization.
3. Write short note on process of fumigation.
4. Differentiate between Antiseptics and Disinfectants.
5. What is disinfection?

## Session 4: Care of Articles

The care of various rubber based articles, ward articles and instruments used in a hospital. the procedures of removing different kind of stains. The hospital uses various methods for cleaning articles and equipment such as autoclaving, sterilization etc.

**Care of Rubber Goods**

Rubber items used to treat a patient include a Macintosh, air cushion, ice caps, ice collar, hot water bottles, rubber tube catheters, gloves and rubber beds. HHA should make all efforts to use the rubber goods for a longer period of time. Exposure to heat, light, moisture and chemicals reduces the lifespan of natural and synthetic rubber. They should not be stretched or folded, never use a pin to fix a rubber items in any place. Never expose them to sunlight. Rubber goods should never be washed with boiling water. Rubber goods should not be dried in contact with artificial heat nor radiators or stoves. They should be free from grease and acid. They should be kept away from contact with metal items. When storing rubber goods, especially care should be taken that the surface of any two items is not in contact with each other. Rubber goods should not be pressurized by placing any kind of weight on them and they should not be tied in knots. They should not be hung on hooks or nails.

**Cleaning of Rubber Mackintosh**

- Spread the Macintosh on a table or on a flat surface and moisten it with cold water.
- Using a clean cloth or towel, rub the upper surface with soap and water.
- Fold on the other side and repeat the process as above.
- Wash both the front and back surface of the mackintosh under running water.
- If there are stains or dirt, the proper method should be used to clean them.
- Use lysol or Dettol 1: 40 for contaminated Macintosh.
- Spread them without wrinkles and hang them in the shade to dry.
- When both surfaces are completely dry, lightly layer them with French chalk powder.
- Always store them flat or roll and should never be folded.
- Surfaces do not hold together, but are separated by old linen or paper. Whenever possible, keep them in an airtight container in a cool place.

**Care of Rubber Gloves**

- The gloves wearer must first wash their hands to prevent the spread of blood and other organic matter.
- After removing them by hand, they are washed with soap and cold water, first outwardly, then inwardly.
- Both inside and outside should be thoroughly rinsed with water as described above.

- To check for any hole in the glove, fill it with air and dip it in the water. If there is a hole, bubbles will pass through the water.
- When the gloves are dry, then they are packed in pairs of gloves on the right and left by adding powder inside and outside. So that they can be reused.
- This is best method of sterilizing the gloves in steam. The pressure is kept to a minimum to prevent the glove from melting and deteriorating.

**Care of the Rubber tubes**

Catheters are of different sizes and quality according to the needs of the patient. The size of the catheter is labeled on French or English scales.

- After using the rubber catheter, wash it under running water for 60 seconds, hold the catheter upwards and let the water run.
- A small amount of organic material may collect at the end of the rubber tube. Remove them using a small swab stick.
- Use soap and warm water to clean and remove dirt and grease.
- Wash them once more for 30 seconds under running tap water.
- Boil the catheter tube in hot water for at least 5 minutes, and then place them on paper or towels to dry or hang them to dry.
- After the tubes are dried, store them in an airtight container by adding powder
- Sterilized or autoclave the catheter tubes before use.

It is recommended that the tubing which contained blood and infected should never be used again for any kind of intravenous infusions since they cannot be cleaned properly. It is better to use disposable type of tubes which are available in the market. Certain catheters e.g. Ureter catheters that are easily damaged by heat, light, and moisture are disinfected using formalin tablet.

Hard rubber tips used in cleaning and medicating the body cavities (e.g. douche nozzle) also need special care. They are molded into special shapes. It is essential that the original shapes of the tips be maintained. Heat softens the rubber, reduces the curved up to a straight tip and roughens the polished surface. For these reasons such instruments are disinfected with chemicals.

**Cleaning of all rubber goods (air cushions, rubber beds, hot water bottles, ice caps and ice collars)**

Do not add water to clean the air cushion and airbed. Use of water is sufficient for cleaning from outside. During cleaning, its air should be removed, as the edges of the articles have a tendency to exert extra pressure while cleaning and they can crack.

Air cushions or bed valves should never be completely submerged in water as it spoils them and stops working. Cleaning and storage is done like other rubber goods, but it is filled with some amount of air to prevent the two surfaces from coming into contact with each other.

The hot water bottle, ice cap and ice collar should be emptied of the material inside immediately after use. Wash and dry like other rubber items. Hang the bag upwards to drain the water. Ice bags that cannot be hung in the sun to dry can only be cleaned or dried with a piece of dry cloth. And when the bag becomes dry, it is filled with air and inflated. Air cushions, ice bags and ice collar covers are disinfected and sent to the laundry.

**Care of Bedpans**

- Before emptying the bedpan, the contents inside it should be inspected. Sometimes patients are thrown in cotton sponges or sanitary pads in the bedpan, they are removed using the forceps.
- Empty the bedpan in a lavatory pan. And care must be taken to avoid soaking the edges of the basin.
- Rinse the bedpan with cold water under force. Wash with warm water using a brush and soap. And rinse well.
- To disinfect bedpans, soak them in Lysol 1:40 solution for 60 minutes or sterilize in a bedpan sterilizer.
- Bedpan can be kept under direct sunlight for a few hours so that they can deodorize and disinfect. Keep them dry on the bedpan rack for next use.

**Care of Urinals**

Urine should not be collected and stored in the urinal pot for a long period of time because by doing this, it starts to form a layer inside it, which is difficult to clean, and the patient's urine also spreads disease. The process of urinal pot cleaning and disinfection is carried out in the same way as bedpans.

**Care of Sputum Cups**

Non-infectious sputum may be emptied into the lavatory pan. Infectious sputum cups (such as the sputum of a tuberculosis patient) can be destroyed by boiling them with chemicals, disinfecting or burning them. The work of cleaning and disinfecting the sputum cups is done like a bedpan. Before giving the spit cup to the patient, add a small amount of antiseptic lotion, the main purpose of which is to prevent the spit from sticking to the sides.

**Care of Sharp Instruments**

Knives and scissors are the most commonly used sharp tools. The accelerating devices are sterilized by a hot air sterilizer, in which the device is kept at a temperature of 160°C for 60 minutes. Chemical disinfection can be done by completely submerging the equipment in pure dettol or other disinfectant solution, which are not corrosive. The effect of the chemical disinfectant must be examined before use.

**Care of Glassware**

Glassware used for the parenteral therapy should be rinsed with freshly distilled water. If the distilled water leaves an unbroken film on the glass surface, it shows that the glass is clean. If any grease is present, the film will be broken and droplets

will form. When sterilizing glass containers, they are to be kept inverted in the autoclave. If they are kept in penetration of all surfaces, a small amount of distilled water in the vessel will force out the air. When the glass goods are sent for boiling or autoclaving, they should be adequately padded to prevent breaking by rubbing with hard surfaces.

**Care of Linen**

Care of linen is important as it is an expensive item, in the running of a hospital. Care of Linen It costs much to buy and much to launder it. linen spoiling and wastage will be avoided If the following rules are followed:

- Linen should be placed in a different order in the cupboard with different stock and labeled separately to prevent confusion.
- Linen should be kept in a cupboard and given to the patient when needed.
- The patient should refuse to take linen home when discharged from the hospital.
- If the linen becomes stained or dirty by urine or loose motion, it must first be washed in warm water to remove the stain.
- If there are stains then remove them using a proper stain remover.
- Linen used by an infectious patient must be disinfected first before being sent to the laundry.

## Activities

**Activity 1:** Visit a nearby hospital and identify the disinfectant used for the below mentioned objects and fill the table given below:

| Object | Disinfectant |
|---|---|
| Rubber tubes | |
| Bed pan | |
| Gloves | |
| Needle | |
| Linen | |

**Activity 2:** Fill the below table showing the list of materials used for the care of the articles in the hospital.

| Article | Material used for the care |
|---|---|
| Rubber Goods | |
| Rubber Mackintosh | |
| Rubber Gloves | |
| Rubber Tubes | |
| Air Cushions | |
| Rubber Beds | |
| Hot water bottles | |
| Ice caps & Collars | |

## Check Your Progress

**A. Multiple choice questions**

1. The best method for sterilization of glass syringe_____.
   a) Aluminium powder,
   b) Dettol,
   c) Hot air
   d) Autoclaving
2. _____utensils can be easily cleaned by
   a) Glassware,
   b) Scissors
   c) crockery
   d) stainless steel

**B. Match the following**

| Articles | Disinfectant |
|---|---|
| 1. Rubber mackintosh | a) Lysol/direct sunlight |
| 2. Crockery scutlerise | b) Soaps and cold water |
| 3. Bedpans | c) Dettol/Lysol |
| 4. Rubber gloves | d) Boiling or dry storage |

**C. Write the following questions answer**

1. Write how to take care of rubber goods for reuse.
2. What precautions should be taken while disinfecting sharp instruments?
3. How do you remove the blood stains from linen

# Module 5 Bio Medical Waste Management

## Introduction

In healthcare industry, the materials that are not utilized fully is discarded, and treated as waste. Modern hospitals consume lot of materials for rendering health services to the people. Wastes are generated as a result of diagnostic, therapeutic, immunization or research activities in the hospitals.

These waste materials have the potential of transmitting serious diseases to the healthcare workers, visitors of the hospital including patients. Various terms are used in relation to the hospital waste like “medical waste”, regulated medical waste” or “hospital waste”. In hospital waste management, the popular term is bio-medical waste. Bio medical waste is the waste generated while the clinical management of patients include syringes, needless, ampoules, disposable plastics, microbial wastes, human body parts, dressing and disposable plastics.

**Fig. 5.1: Bio medical waste management**
**Courtesy: Govt. J.P.hospital, Bhopal**

## Learning Outcomes

- Demonstrate the knowledge of bio- medical waste management
- Demonstrate the knowledge of the Source and disposal Method of Bio-Medical waste
- Identify the role of personnel involved in waste management

## Module Structure

Session 1: Introduction to Bio – Medical Waste Management

Session 2: Sources and Disposal of Bio Medical Waste

Session 3: Segregation and Transportation of Bio Medical Waste

Session 4: Role of Hospital Staff for Management of Bio Medical Waste

# Session 1: Introduction to Bio Medical Waste Management

In this session, you will learn about the concept of Bio-medical waste management. You will study about the risks involved with poor waste management, classification of hospital waste and disposal of biomedical waste.

**Definitions**

Before we study the classification and disposal of hospital waste, let us first try to understand the meaning of some of the terminologies used in hospital waste management.


**Fig. 5.2: Bio-medical waste**

(a) **Bio-Medical Waste:** "Any solid, fluid or liquid waste along with container, any waste generated while the clinical procedures are carried out.

(b) **Medical Waste:** Is the waste generated at hospitals, clinics, physician's office, dental clinics, blood banks and medical research facilities.

(c) **Clinical Waste:** Is the waste generated after medical care provided in hospitals or other medical care units but not the domestic waste.

(d) **Hospital Waste:** It refers to all waste, biological or non-biological that is generated from a hospital, and is not intended for further use.

(e) **Pathological Waste:** Is the waste generated during surgery/autopsy any other medical procedures for example human tissues, body parts, body fluids and specimens along with containers.

(f) **Infectious Waste:** Is the type of bio-medical waste capable to transmit viral, bacterial or parasitic diseases, due to high concentration and virulence of pathogenic organism.

(g) **Hazardous Waste:** Is the type of Bio medical waste which can be harmful for health and life of human beings.

(h) **Radioactive Waste:** It includes waste contaminated with radio nuclides; it may be solid, liquid or gaseous waste. These are generated from in-vitro analysis of body fluids and tissues, in-vitro imaging and other therapeutic procedures.


**Fig. 5.3: Container with radioactive symbol**

(i) **Pressurized Waste:** It includes compressed gas cylinders, aerosol cans and disposable compressed gas containers.

(j) **General Waste:** Is the general/domestic waste generated in offices, public areas, stores, catering Areas for example metal cans, floor sweepings and stationery paper waste.

(k) **Recyclable Waste:** Recycle waste are cleaned glass paper, corrugated cardboard, aluminum, X-ray film silver from solution used to develop X-ray films.

## Classification of Hospital Waste

The World Health Organization (WHO) has classified the hospital waste in to the following categories:

1. General Waste: The waste generated from office, administrative offices, kitchen, laundry and stores.
2. Sharps: Hypodermic needles, needles attached to tubing, scalpel blades, razor, nails, broken glass pieces, etc.
3. Infected waste: Equipment and instruments used for diagnostic and therapeutic procedures, waste tissues after surgical procedure and organs removed and autopsy.
4. Chemical waste: Formaldehyde used to preserve tissues and organs, fixer and developers used in radiology department. Solvents like xylene, acetone, ethanol and methanol used in laboratories.
5. Radioactive waste: Various radioactive wastes generated through the activities of the department like research activity, clinical laboratory and nuclear medicine department
6. Cytotoxic drugs: Various anti-cancer drugs.

**Fig. 5.4: Radioactive waste**

## Categories of Biomedical Waste

The Ministry of Environment and Forests has drafted certain rules in exercise of powers conferred by section 6,8 and 25 of the Environmental Protection Act 1986. The categories of bio-medical wastes, as per the Biomedical Waste (Management and Handling) Rules 1988 are as follows shown in Table 10:

**Table 10: Categories of Biomedical Waste**

| Waste Category | Waste class and description |
|---|---|
| Category No.1 | **Human anatomical wastes** |
| Category No.2 | **Animal wastes**<br>Animal tissues, body parts, carcasses, organs, bleeding parts, fluid blood discharge from hospitals, animal houses. |
| Category No.3 | **Microbiology and biotechnology wastes**<br>Wastes from laboratory culture, stocks or specimens of microorganisms, human and animal cell cultures used in research and industrial laboratories, wastes from production of biological toxins, dishes and devices used for transfer of cultures. |
| Category No.4 | **Waste sharp**<br>Blades, needles, syringes, scalpels, glass, etc. That is capable of causing puncture and cuts. This includes both used and unused sharps. |
| Category No.5 | **Discarded medicines and cytotoxic drugs**<br>Wastes comprising of outdated, contaminated and discarded medicines. |
| Category No.6 | Solid Waste Items contained with blood, and body fluids including cotton,<br>dressing, soiled plaster casts, linen, beddings, and other materials contaminated with blood. |
| Category No.7 | **Solid waste**<br>Wastes generated from disposable items other than the waste sharps, such as tubings, catheters, intravenous sets. |
| Category No.8 | **Liquid Waste**<br>Wastes generated from laboratory and washing, cleaning house keeping and disinfection activities |

| | |
|---|---|
| Category No.9 | **Incineration ash**<br>Ash from incineration of any biomedical waste. |
| Category No.10 | **Chemical waste**<br>Chemicals used in the production of biological, chemicals used in disinfections, as insecticides. |

## Importance of Hospital Waste

The hospital waste is important from the following point of view:
The staff working in the hospitals is directly exposed to the risks of waste in the hospital. The implications of the hospital waste in relation to the hospital staff can be emphasized on the basis of following points:

(i) The hospital staff is responsible for generating, segregating, collecting, storing, treating of the hospital waste.

(ii) The healthcare worker due to the profession has to work with sharps like needle, blades, etc. and they are at risk of contracting that infection. There is risk of transmission of HIV/AIDS, and Hepatitis B and C.

(iii) The hospital authorities must organize teaching and training programmes for the healthcare workers and the hospital authorities must provide the adequate quantity of gloves, masks, foot wears, goggles, gum boots, gowns.


**Fig. 5.5: Red & white bag container**

The hospital is visited by the patients for treatment and the patients are accompanied by close associates, may be friends or relatives, who prefer to stay with patients for their company and to take care of their non-medical needs. In addition to the attendants of the patients, many visitors also visit the hospital.
Many people in the society are involved in collection of the hospital waste like the rag pickers, who are interested in the polythene bags, plastic wares, used disposable syringes and needles. In all these cases the rag pickers are exposed to risk of transmission of diseases which are of very serious nature like HIV/AIDS, HBV/HCV infections. The hospital administration should care to safe guard the interest of the general public.

Some hospitals throw hospital waste, removed tissues and organs, amputated waste and removed fetuses into the general waste. This issue invites the attention of the public health authorities.

The internal environment of the hospital has got direct communication with the outside environment. The gases and heat generated inside the hospitals are exhausted into the external environment. The internal environment of the hospital is contaminated with bacteria, viruses and parasites, which can pose a threat of spreading infection to the outside environment. The foul gases from mortuary or foul smelling discharges from the labour room, pathology department, anatomy department are discharged directly to the outside environment, which are responsible for the environmental pollution. All such activities have invited attention of the environmentalists and the Government has enacted laws to protect the health of the people and also to safeguard the environment.

**Nosocomial infections**: Nosocomial are infections caught in the duration of stay in a hospital potentially caused by antibiotics resistant organisms. The infection that was not present earlier to admission of patient's to the hospital, but occurs within 72 hours of admission in hospital. The sources of hospital acquired infection are as follows:

a) Patients own flora
b) Flora of another patients
c) Fomites-any object or substance capable of carrying infectious organisms.
d) Environmental sources
e) Contamination by patients, attendants, visitors and hospital staff.

The routes of the transmission of infection can be:

a) Aerial route for example, through inhalation of hospital dust.
b) Direct contact for example, through abrasions on skin, or through mucous membrane.
c) Faeco – oral route for example, through ingestion of food, water with contaminated hands
d) Parenteral route during the process of injections and infusions.
e) Through equipment and materials.

## Activities

Visit a nearby hospital. Wear personal protection equipment and identify the different wastes. Classify them according to the category number and fill the table given below:

| Waste Category | Waste |
|---|---|
| Category No.1 | |
| Category No.2 | |
| Category No.3 | |
| Category No.4 | |
| Category No.5 | |
| Category No.6 | |
| Category No.7 | |
| Category No.8 | |
| Category No.9 | |
| Category No.10 | |

## Check Your Progress

**A. Multiple Choice Questions**

1. The bio-medical waste should be properly discarded because it has –
   a) The potential to transmit diseases
   b) Radioactive properties
   c) Good decaying materials
   d) All the above

2. WHO has classified hospital waste into general, infected, chemical, radioactive, _____ and _____.
   a) General waste
   b) Sharp
   c) Cytotoxic drugs
   d) b and c

3. Nosocomial sources of infection are the patient's or other patients flora, fomites, environmental sources or_____
   a) Contamination by patient's, visitors and hospital staff
   b) Developmental disorder
   c) Road traffic accidents
   d) All the above

4. The routes of transmission of nosocomial infection are –
   a) Direct contact
   b) Faeco-oral and nasal route
   c) Parenteral route
   d) All the above

**B. Match the following**

| Waste | Generated |
|---|---|
| 1. Microbiology | a) generated from disposable items |
| 2. Waste sharp | b) generated from laboratory and washing |
| 3. Solid waste | c) Needles, syringes, scalpels, blades, glass, etc |
| 4. Liquid Waste | d) chemicals used in the production of biological |
| 5. Chemical waste | e) Wastes from laboratory culture, stocks or specimens |

**C. Write the following questions answer -**

1. Write any five terminologies that are used in hospital waste management.
2. Write the classification of hospital - generated waste.
3. How bio-medical waste management helps in environmental protection.
4. What is hospital-acquired infection (HAI).
5. Describe the importance of hospital waste management.

## Session 2: Sources and Disposal of Bio Medical Waste

In this session, students will learn about the sources and disposal methods of bio-medical wastes.

### Sources of bio-medical waste

Biomedical waste is generated from Medical sources, biological and activities in hospitals, clinics, healthcare organizations; veterinary hospitals, etc. let us now try to identify the various generators of biomedical wastes. The sources can classified as major and minor source, depending upon the amount of waste generated.

**Hospital**

- Hospitals of all category like general, specialist hospitals, private as well as public sector hospitals generate biomedical wastes.
- Departments like Surgery, Gynaecology and Obstratrics, Paediatrics, Oncology, orthopaedics, Ophthalmology, ENT, Physical Medicine and Rehabilitation, Emergency Services, Operation Theatres, ICU, Critical Care Medicine, Burns and trauma, Neurosurgery etc. generate specific type of biomedical wastes.

**Clinics**

- Physicians, Maternity clinics, Dentists, Immunization Clinics, Dialysis centres and Endoscopists.
- Dispensaries of state or central governments

**Healthcare organizations**

- Polyclinics

- Nursing homes
- Geriatric homes
- Home for mentally retarded
- Mental asylums

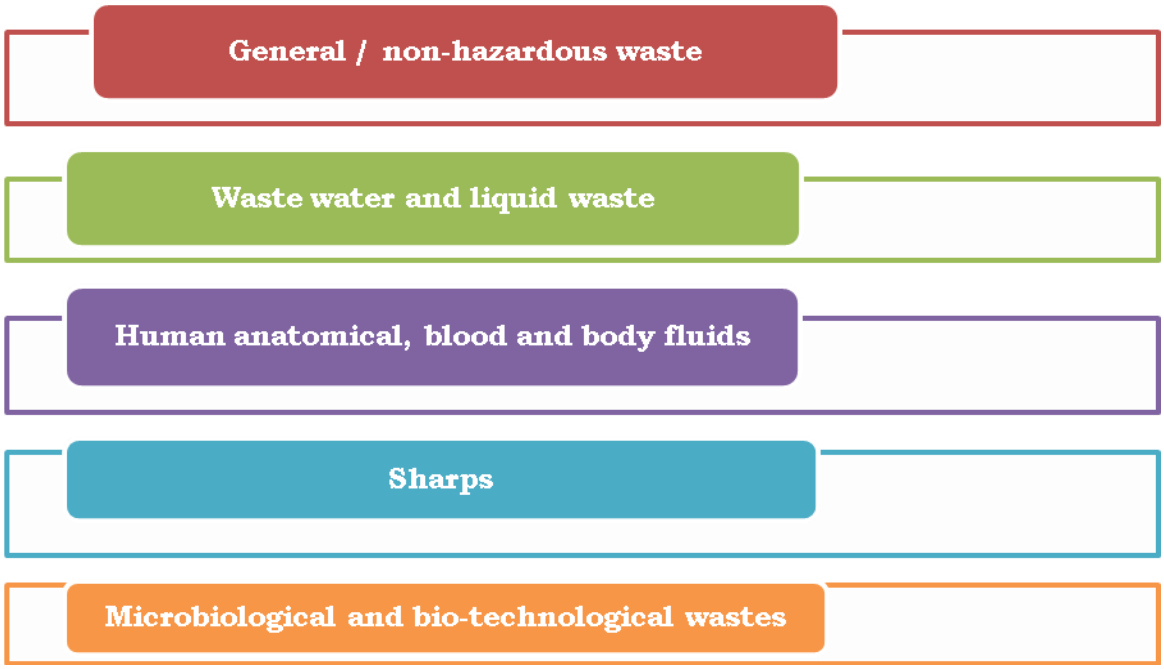
**Support Services**

- Blood banks, pharmacy, mortuary, laundry, Laboratories

**Disposal of Wastes**

Biomedical waste should be disposed separately, and not with other wastes. It should be treated and disposed as per standards of the notification of Bio Medical Waste (BMW) rule (1998) of Ministry of Environment & Forest, Govt. of India.

**After the waste is treated it is disposed in following categories**



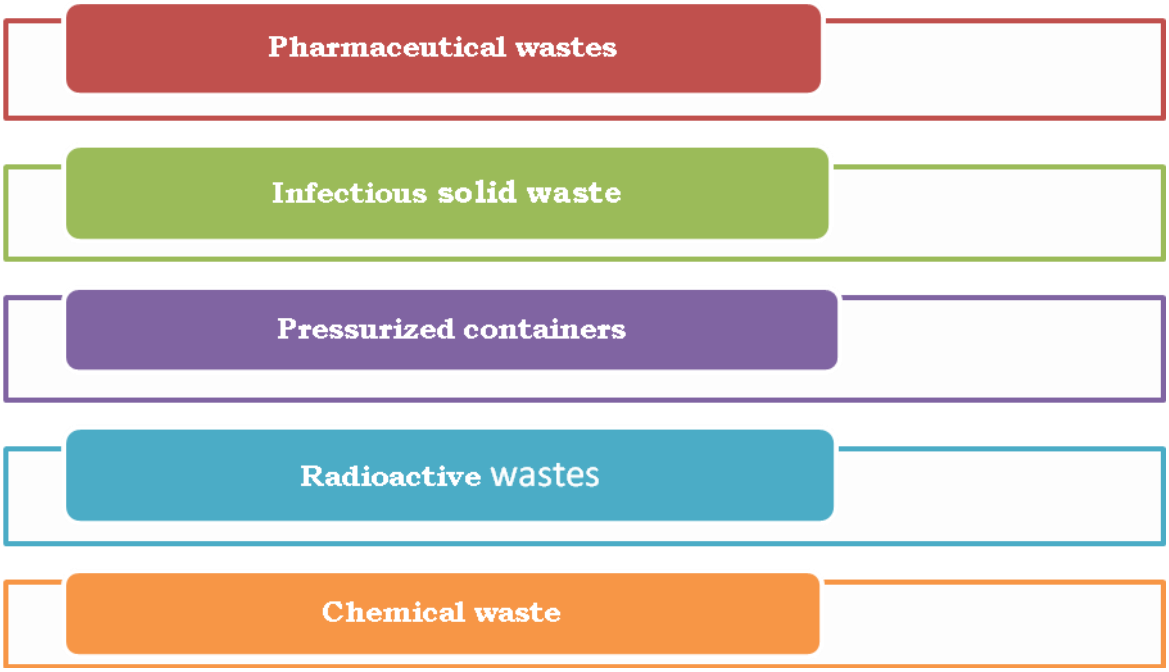



**Fig. 5.6: Categories of waste disposal**

## Activities

1. Visit the nearest hospital and identify the different types and sources of biomedical waste and fill the table below.

| Name of garbage | Department generating waste |
|---|---|
| Human organ/tissue body fluids | |
| Sharp needle and instruments | |
| Infected dressing and bandage | |
| Plastic materials | |

## Check Your Progress

**A. Multiple choice questions**

1. Disposal of general non-hazardous waste for small quantity is done by which of the following methods -
   a) Landfill
   b) Use of pits
   c) Composting
   d) All the above

2. The following methods are used to dispose of large quantities of waste:
   a) NADEP composting
   b) Pelletisation technology
   c) Biopress and manure
   d) Pyrolysis
   e) All the above

3. The Bio-Medical Waste Disposal Guidelines Standards are set out in Schedule V of the Bio-Medical Waste Rules -
   a) Niti Aayog
   b) Ministry of Health & Family Welfare
   c) Ministry of Environment & Forest
   d) None of the above

**B. Tick the true and false in the following sentences:**

1. The best disposal method of human organs, tissue, blood and body fluids is incineration.
2. Radioactive waste is disposed of as per the guidelines issued by the Indian Atomic Council.

**C. Write down the methods and techniques used for the disposal of bio-medical waste.**

| Waste | Methods/techniques |
|---|---|
| General/non-hazardous waste | |
| Waste water and liquid waste | |
| Human anatomical, blood and body fluids | |
| Sharps needle and instruments | |
| Microbiological and bio-technological wastes | |
| Pharmaceutical wastes | |
| Infectious solid waste | |
| Chemical waste | |
| Radioactive wastes | |
| Pressurized containers | |
| | |

**D. Write the following questions answer -**

1. List the departments of hospitals that generate bio-medical waste.
2. Write the methods of disposal of non-hazardous waste.
3. Describe the method of disposal of microbiological wastes in hospitals.

## Session 3: Segregation and Transportation of Bio Medical Waste

In this session, you will learn about segregation, packaging, transportation and storage of bio-medical waste. You will study the colour coding criteria recommended by WHO for storing and disposing different class of bio-medical wastes.

The following points should be remembered while segregating, packaging, transportation and storage of biomedical wastes:

1. Biomedical waste to be kept separate than other wastes.
2. Segregate the bio medical waste at the point of generation of waste (i.e wards) and put in labeled containers before transportation for treatment and disposal.
3. The container should be labeled properly when being transported to other premises for disposal.
4. Untreated bio medical waste to be transported in a government vehicle authorized by a competent authority.
5. U ntreated bio medical waste not to be stored for more than 48 hours, if necessary permission to be taken by authorized person.


**Fig. 5.7: Transportation of bio-medical waste**

### Colour Coding and Type of Containers for Bio-medical Wastes

Colour coding as recommended for developing countries by WHO.

| S.N. | Category of Waste | Recommended colour code |
|---|---|---|
| 1 | General non-hazardous waste | Black bag |
| 2 | Sharps (whether infected or not) | Yellow bag |
| 3 | Infected waste (Not containing sharps) | Yellow bag |
| 4 | Chemical and pharmaceuticals (other than Cytotoxic drugs, radioactive waste, high pressure containers) | Red bag |
| 5 | Clinical waste that requires autoclaving | Blue bag |

**Types and Colour of Conatiners for disposal of biomedical waste (as per Ministry of Environment and Forest Guidelines)**

| Waste Category | Waste Class | Type of container | Colour code |
|---|---|---|---|
| Category No.1 | Human anatomical waste | Plastic Bag | Yellow |
| Category No.2 | Animal waste | Plastic Bag | Yellow |
| Category No.3 | Microbiological and biotechnological waste | Plastic Bag / disinfected container | Yellow / Red |
| Category No.4 | Sharp | Plastic Bag | Blue/White translucent |
| Category No.5 | Discarded medicines and cytotoxic drugs | Plastic Bag | Black |
| Category No.6 | Solid waste | Disinfected container /plastic bag | Yellow / Red |
| Category No.7 | Solid Waste | Disinfected containers/plastic bag/puncture proof containers | Red / blue / White |
| Category No.8 | Liquid waste | Not Applicable | Not Applicable |
| Category No.9 | Incineration Ash | Plastic Bag | Black |
| Category No.10 | Chemical Waste | Plastic Bag for solid | Black |


**Fig. 5.8: Coloured containers for disposal of bio-medical waste**

## Transportation of Biomedical Wastes

Methods of transportation of Bio medical wastes are internal and external transportation.

### Internal Transportation

The sanitation staff from the centralized gang will transport the different coloured polythene bags in garbage bins from the sluice room and different areas of hospital. Push carts and garbage trolleys designed for the purpose only to be used, the waste to be routed by main ramp to the ground floor, then to the area the incinerator/mortuary. The

General waste (in black polythene bags) to be unloaded at the municipal dumps, opposite the mortuary, adjacent to the incinerator site. Sanitation inspector to be informed about leakage or spillage, he/she will take care for cleaning and disinfection of the trolleys.

### External Transport

On request placed by the hospital authorities the Municipal authority will send the vehicle to collect and transport the general waste packed in black coloured plastic bags.


**Fig. 5.9: Internal transportation of hospital waste**

### Treatment and Disposal of Hospital Waste

**General Waste**: About 80-80% waste generated in the hospitals is general waste and is like the domestic waste, this is non hazardous. The contents of this waste are peels of fruits, paper packages of tea/coffee, food articles, polythene bags, wraps of disposable materials. This waste to be put into black polythene bags to be disposed in Municipal dumps, subsequently Municipal authoritiesto carry away for final disposal.

**Incineration:** The waste carried in yellow bags is carried away for disposal in incinerator.

**Autoclaving and Shredding:** This procedure is adopted for waste collected in blue gabs to the site where autoclave facility is available.

**Radioactive Waste:** This waste is generated in radiological and imaging procedure in the department of Radiotherapy. The solid waste as syringes, absorbent paper, clothing are stored in a drum/container for decay. The liquid radioactive waste are diluted and drained in sewers. The gaseous waste diluted and dispersed in atmosphere.

**Liquid and Chemical Wastes :** This type of waste are disinfected by 1% sodium hypochlorite solution then drained into drainage or sewer.

## Activities

Visit a nearby hospital and observe the segregation process of bio-medical waste. Do not forget to wear personal protective equipment. Identify the type of bio-medical waste and fill the table given below:

| Color code | Class of waste | Type of container | Waste category |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

## Check Your Progress

**A. Fill in the blanks**

1. Waste collected in _____will be transported to the site of autoclaving and shredding for treatment.
2. _____ is generated during the process of imaging the body part.
3. Transportation of bio-medical wastes can be divided into _____and_____ transport.
4. Liquid and Chemical Wastes must be disinfected with at least _____ chemical solution.

**B. Multiple Choice Questions**

1. In which color bags the waste collected is taken to the incineration site.
   a) Red bag
   b) Yellow bag
   c) Blue bag
   d) Black bag

2. In - charge of coordinating waste disposal between hospital and municipal authorities.
   a) Waste Officer
   b) Municipal Officer
   c) Sanitation Officer
   d) None of the above

**C. Write the following questions answer -**

1. What should be kept in mind while transporting and storing biomedical waste.
2. Describe the treatment and disposal of hospital waste.
3. Explain the colour code for the following types of waste:
   a) General non-hazardous waste
   b) Sharps
   c) Infected waste
   d) Chemicals

Human anatomical waste.

## Session 4: Role of Hospital Staff for Management of Bio Medical Waste

In this session, students will know the Role and functions of authorities or personnel involved in bio-medical waste management in a hospital. They will also study the importance of providing training to the staff of the hospital.

### (A) Role of Medical Superintendent

The overall responsibility of Medical Superintendent is to implement the directives of waste management in the hospital so, that waste is disposed without adverse effect to society. The medical superintended is supposed to submit the annual report and keep the higher authorities updated about disposal of Bio medical waste.

### (B) Functions of Hospital Waste Management Committee

1. To ensure the circulation of copies of Bio-medical Waste Rules and guidelines in Departments.
2. To conduct awareness programmes regarding bio-medical waste management.
3. To conduct training programmes for Medical Professionals, Nursing Professionals, General Duty Assistant and other staff on biomedical waste management.

One staff member from each department of the hospital and support sewers will supervise the segregation of Bio medical waste. Nurses assisted by General duty assistant will supervise the work in their wards.

### (C) Role of Officer In-charge of Waste Management

The person concern for Bio medical waste management is the solely responsible to monitor the Bio medical waste activity by liasoning with In-charge of various departments Matron and Infection Control Officer. In the same way the staff and In-charge of various departments will liaise with the Officer In-charge for Bio medical waste management of the health institutions.

### (D) Role of Matron / Nursing Superintendent

The Matron to assign duties to one of the Sister In-charge of Hospital Waste Management, to monitor the activity. She shall conduct surprise rounds and shall review and evaluate the various aspects of scientific hospital waste management at

all levels from generation and segregation to final disposal. She will attend the meetings of Hospital Waste Management Committee will represent the Matron, will also co-ordinate the training of nurses on Hospital Waste Management with administration.

**(F) Role of In-charge Sanitation Inspector**

The In-charge Sanitation Inspector is responsible for the implementation, monitoring and evaluation of hospital waste management from collection and storage of hospital waste to its final disposal. He/she attend the Hospital Waste Management Committee meetings and ensure the training of the staff. Regular in-service training and evaluation of the sanitation attendants carried out by him/her. He/she shall also provide feedback information to Officer In-charge Waste Management in case of accidents and spills.

### Training on Hospital Waste Management

For an effective Bio medical waste management in a health care all the categories of staff should be trained, before the beginning of the training the staff. The needs of the training to be explained by interactive, demonstration and awareness sessions. The training session should be inclusive of following:

- Awareness of different categories of waste and potential hazard
- Waste minimization, reduction in use of disposables
- Segregation policy
- Proper and safe handling of sharps
- Use of protective gear
- Colour coding of containers
- Appropriate treatment of waste
- Management of spills and accidents
- Occupational health and safet

## Activities

Visit a nearby hospital and supervise the duties and functions of bio-medical waste management by health personnel .

| Colour code | Class of waste | Type of container | Waste Category |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

## Check Your Progress

**A. Fill in the blanks**

1. The waste is disposed off without affecting the human_____.
2. The nurse / HHA is responsible for overseeing _____in the wards of each floor in the hospital.
3. To conduct _____regarding bio-medical waste management.
4. _____ committee ensure Bio-medical waste management of a hospital.

**C. Match the following column A and B**

| Column A | Column B |
|---|---|
| 1. Medical Superintendent | a) Monitoring and evaluation of the waste collection |
| 2. Officer In-charge | b) implement the guidelines for Hospital waste management |
| 3. Heads of lab and department | c) coordinate the training of nurses in Hospital waste management |
| 4. Nursing Superintendent | d) circulation of all policy decisions |
| 5. Sanitation Inspector | e) responsible implementation of necessary Guidelines |

**C. Write the following questions answer**

1. Describe any four important functions of the Hospital Waste Management Committee.
2. Write the role of medical superintendent.
3. Write the role of other health personnel in biomedical waste management
4. The teacher should give the project to the students to make dustbins according to the color-coding.

# Answer Key

**Module 1: Immunization**
**Session 1: Differentiate between Various Types of Immunity**

**Fill in the Blanks**
1. Adaptive
2. Infection
3. Innate

**Multiple choice questions**
1-d
2-a
3-d
4-c
5-a

**Match the column**
1-b
2-a
3-d
4-c

**Session 2: Vaccination**
**Fill in the Blanks**
1. highly infectious disease
2. Vaccine
3. Edward Jenner
4. Tetanus toxoid

**Choose the True or False**
1- False
2- True
3- True
4- True

**Session 3:Key Components of Universal Immunization Programme (UIP)**
**Multiple choice questions**
1 – c
2 – d

**Session 4: Pulse Polio Immunization Programme**
**Fill in the Blanks**
1. Pulse Polio
2. Poliomyelitis
3. Fecal-Oral
4. Faeces
5. Type-1, Type-2 and Type-3
6. Albert Sabin
7. Surveillance and Investigation of acute paralysis

**Multiple choice questions**

1- a

2- b

**Module 2: Administration of Medication and Physiotherapy**

**Session 1: Drug Administration**

Fill in the Blanks

1. Drug
2. Medicine
3. PRN
4. solid and semi-solid
5. promote health, prevent illness
6. complete and accurate

**Match the following**

1-b, 2-a, 3-d, 4-c

**Session 2: Forms and Routes of Medication**

Fill in the Blanks

1. Oralroute
2. Dermis layer
3. complete and legible
4. Sub lingual medicines

**Match the following**

1-b

2-a

3-d

4-c

**Multiple choice questions**

1-b

2-a

3-d

**Session 3: Classification of Drugs**

Fill in the Blanks

1. Laxatives
2. Diuretics
3. tachycardia

**Match the following**

1-e

2-d

3-c

4-b

5-a

**Session 4: Health and Physiotherapy**

Fill in the Blanks

1. Quality of life
2. Physical exercise
3. Pressing or movement
4. Ultrasound

**Multiple choice questions**

1 – a
2 – b
3 - a

**Session 5: Introduction of Body Mechanics**

Fill in the Blanks

1. Body mechanics
2. patient and staff members

**Session 6: Moving and Patient Positioning**

Fill in the Blanks

1. Therapeutic
2. back
3. Fowler's
4. Left lateral

**Match the following**

1-d
2 – e
3 – g
4-h
5-f
6-c
7 – b
8-a
9- i

**Session 7: Breathing Exercise**

Fill in the Blanks

1. yoga
2.Breathing exercise
3. Sitting upright
4. three blue balls
5. Pursed lip Breathing (PLB)

**Module 3: Geriatric and Child Care**

**Session 1: Introduction to Care of Elderly**

Fill in the Blanks

1. Ageing
2. dental care
3. friends and other relatives

**Match the following**
1 - c
2 - d
Session 2: Age Related Changes in People
**Choose the correct answer**
1 - b
2 - d
**Complete the following words**
Respiratory
Cardiovascular
Gastrointestinal
Urinary
Endocrine
Reproductive

**Session 3: Care of Elderly People**
Fill in the Blanks
1. Regular exercise
2. Nutrition

**Session 4: Legal Needs of Elderly**
Fill in the Blanks
1. food and fluid needs
2. immunity, infectious disease
**Multiple choice questions**
1 – d
2 - c
**Match the Column**
1 - e
2 - d
3 - c
4 - b
5 - a

**Session 5: Nutrition through Life-Cycle**
Fill in the Blanks
1. growth and development
2. balance diet
3. Omega-3 fatty acid
**Match the following Columns**
1 – d
2 – e
3 – a
4 – b
5-c

**Write the full form**

1. Recommended Dietary Allowances
2. National Institute of Nutrition

**Session 6: Duties of Home Health Aide**

Fill in the Blanks

1. Nursing and technical care
2.Home health aide
3. Good interpersonal skills

**Multiple choice questions**

1 - c
2 - d

**Match the Column**

1 – c
2 – a
3 – d
4 – b

**Session 7: Care of Paralytic, Immobile Patient**

Fill in the Blanks

1. Bell's palsy
2. Localized paralysis

**Multiple choice questions**

1 – d
2 - a
3 - d

**Session 8: Assist the Physician in Physical Examination**

Fill in the Blanks

1. Height
2. Visual examination
3. Lying or sitting
4. Tongue depressor
5. Proctoscope

**Match the following**

1 - d
2 - c
3 - b
4 - a

**Session 9: Caring for Infants and Children**

Fill in the Blanks

1. 1 year
2. 12 years
3. 160 bpm
4. 4- 18
5. 5-99

Multiple choice questions
1 – a
2 – c
3 - b
4 - d

**Module 4: Prevention and Control of Infection in Home Setting**
**Session 1: Describe the Disease Causing Microorganism**
Fill in the Blanks
1. Anton van Leeuwenhoek
2. Peptidoglycans
3. Photosynthesis
4. Living organism
5. environment

**Session 2: Causes of Common Human Diseases**
Fill in the Blanks
6. Part or whole body
7. Symptoms, signs
8. microbes
9. inflammatory disease
10. lower extremities

M**atch the Column**
1 – d
2 – e
3 – a
4 – b
5 - c

**Multiple choice questions**
1 - b
2 - a
3 - d
4 – c

**Session 3: Methods of Disinfection**
Fill in Blanks
1. antiseptics
2. 220 grams of sulfur
3. cleaning
4. pathogenic organism
5. Sterilization

Session 4: Care of Articles
**Multiple choice questions**
1 - c
2 -d
Match the following

1 - c
2 - d
3 - a
4 – b

**Module 5: Bio Medical Waste Management**

**Session 1: Introduction to Bio-Medical Waste Management**

Multiple choice questions
1 - a
2 -d
3 - a
4 - d

Match the following
1 - e
2 - c
3 - a
4 - b
5 - d

**Session 2: Sources and Disposal of Bio-Medical Waste**

Multiple choice questions
1 - d
2 -e
3 - c

**True of False**

1. true
2. false

**Session 3: Segregation and Transportation of Bio-Medical Waste**

Fill in the Blanks
1. blue bags
2. Radioactive waste
3. intramural, extramural
4. 1% sodium hypochlorite

**Multiple choice questions**

1 - a
2 -c

**Session 4: Segregation and Transportation**

Fill in the Blanks
1 health and the environment
2.segregation
3.awarenessprogrammes
4. hospital waste management

**Match the following Column**

1- b
2-d
3-e
4-c
5- a

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