

Sector: Healthcare

NSQF Level 2 (CLASS XI)

Student Workbook

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Sector: **Healthcare**

**Vocational Subject: Healthcare
Services – PCA**

NSQF Level 3; Class XI

Student Workbook

Sector: Healthcare

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Preface

The student workbook is a part of the training package developed for the vocational subject under the National Vocational Education Qualification Framework (NVEQF)/ National Skill Qualification Framework (NSQF), an initiative of Ministry of Human Resource Development (MHRD), Government of India. The NSQF sets common principles and guidelines for a nationally recognized qualification system covering Schools, Vocational Education and Training Institutions, Technical Education Institutions, Colleges and Universities. It is envisaged that the NSQF will promote transparency of qualifications, cross-sectoral learning, student- centred learning and facilitate learner's mobility between different qualifications, thus encouraging lifelong learning. The National Curriculum Framework, 2005 recommends that children's life at school must be linked to their life outside the school. This principle makes a departure from the legacy of bookish learning which continues to shape our system and causes a gap between the school, home, community and the workplace.

The Pandit Sunderlal Sharma Central Institute of Vocational Education (PSSCIVE), a constituent of National Council of Educational Research and Training (NCERT) has developed modular curricula and learning materials for the vocational subjects offered from Classes IX to XII (NSQF Levels 1-4). This student workbook, which has been developed keeping in view the National Occupation Standards (NOSs) set by the Healthcare Sector Skill Council (HSSC) for the Job Role of Patient Care Assistant/ General Duty Assistant is meant for students who have passed Class X or equivalent examination. The National Occupation Standards are a set of competency standards used for recognizing and assessing skills and knowledge needed to perform effectively in the workplace.

The success of vocationalisation of education in schools depends on the steps that Principals and Teachers will take to encourage children to reflect their own learning and to pursue imaginative and on-the-job training activities. Participation of learners in skill development exercises and inculcation of values and creativity is possible if we involve children as participants in learning and not as receivers of information. Flexibility in the daily time-table would be a necessity to maintain the rigour in implementing the activities and the required number of teaching days will have to be increased for teaching vocational subjects.

The student workbook has been developed and reviewed by a group of experts and their contributions are admirably acknowledged. The utility of the workbook will be adjudged by the qualitative improvement that it brings about in teaching-learning. The likelihood of text errors, including typographical errors cannot be ruled out. The feedback and suggestions on the content by the teachers and other stakeholders will be of immense value to us in bringing about necessary improvement in the student workbook.

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About your workbook

The student workbook contains sessions which will help you to acquire relevant knowledge and skills (generic and domain-specific skills) related to the job role. Each session is small enough to be easily tackled and digested by you before you move on to the next session. Animated pictures and photographs have been included to bring about visual appeal and to make the text lively and interactive for you. You can also try to create your own illustrations using your imagination or taking the help of your teacher.

Let us now see what the sections in the sessions have for you.

Section 1: Introduction

This section introduces you to the topic of the Unit. It also tells you what you will learn through the various sessions covered in the Unit.

Section 2: Relevant Knowledge

This section provides you with the relevant information on the topic(s) covered in the session. The knowledge developed through this section will enable you to perform certain activities. You should read through the information to develop an understanding on the various aspects of the topic before you complete the exercise(s).

Section 3: Exercise

Each session has exercises, which you should complete on time. You will perform the activities in the classroom, at home or at the workplace. The activities included in this section will help you to develop necessary knowledge, skills and attitude that you need for becoming competent in performing the tasks at workplace. The activities should be done under the supervision of your teacher or trainer who will guide you in completing the tasks and also provide feedback to you for improving your performance.

Section 4: Assessment

The review questions included in this section will help you to check your progress. You must be able to answer all the questions before you proceed to the next session.

Sector: **Healthcare**

NSQF Level 3; Class XI
HSS301 - NQ2014

Hospital Management System-II

Student Workbook

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Session 1: Role of General Duty Assistant in Admission of Patient

In this session, you will learn about reception of the patient in the hospital and recording personal and medical data of the patient. You will also study primary medical examination performed by Inpatient Department (IPD) and Outpatient Department (OPD) Department. At the end of the session, you will acquire the knowledge of the role of General Duty Assistant (GDA)/ Patient Care Assistant (PCA) in preliminary observation and admission of patient in the hospital.

Relevant Knowledge

Admission of Patient

Admission of a patient means, allowing a patient to stay in the hospital for observation, investigations and treatment of the disease that he/she is suffering from. The admission of a patient to a hospital can be either emergency or routine. The emergency admission means that the patients are admitted in acute conditions requiring immediate treatment, e.g. patients with heart attack, accidents, acute appendicitis, poisonings, labour pains, diarrhoeas, dysentery, hyperpyrexia, haematemesis, dyspnoea, shock, etc. In emergency admissions, every moment is precious, therefore, the patient should be admitted to the casualty department or emergency ward and the treatment should be initiated immediately to save the life of the patient.

Routine admission means that the patients are admitted for investigations and planned treatments and surgeries are done e.g., patients with hypertension, diabetes chronic appendicitis, jaundice, hernia, cirrhosis of liver, chronic renal failure, nephritis, bronchitis, etc.

Reception of Patient

Since the first impression is likely to be vivid and not easily erased, it is especially important that the patient and those who are with him/her receive the most courteous attention and care in the outpatient department. The personnel in the admitting department should greet the patient and make him/her at ease. In emergency conditions, no time should be lost to initiate the treatment. The manner in which the nurse and the physician receive and treat the patient is after all the most important aspect of his reception and admission to the hospital.

Recording of Personal and Medical Data of Patient

The clerk in the record section is responsible for recording certain data that are essential for identification of the patient. He/she questions the patient or his family members to get the name, address, age, sex, religion, occupation, income, marital status, address, telephone number and name and address of the nearest relative. He/she records it in the outpatient record. Patients too ill to answer questions should be

admitted immediately and the necessary data is supplied by the family or friends at the first opportunity.

In order to provide proper service and to give immediate care, it is necessary to know the diagnosis or suspected diagnosis, the duration of illness, the name of the physician to whom he/she is to be referred. This can be obtained by appropriate questioning of the patient.

The patient is given the outpatient number which he keeps with him/her for future reference. He is given necessary direction to proceed further for consulting the doctor.

Medical History and Examination of Patient

A detailed social and medical history of the patient is taken by the physician and is recorded. The patient's temperature, pulse, respiration and blood pressure are recorded. A thorough examination of the body from head to foot will reveal any deviation from normal structure and functions which will help the physician to diagnose the disease. Necessary investigations, such as X-ray, laboratory test etc., are also made to diagnose the disease and to prescribe the treatment.

Relatives of friends who bring the patient to the hospital often want to meet, and talk to the physician about the patient. The GDA should make necessary arrangements for the relatives to meet the physician.

The patients who are suffering from mild ailments are sent home with necessary treatment. Others are admitted to the hospital for further investigations and treatment.

Transporting Patient

Patients who are not very ill and are allowed to walk are escorted to the clinical division by a GDA or an attendant. Wheel chairs should be available for those who are too sick, weak or lame to walk. Patients who are brought to the hospital in the ambulance should be carried to their respective wards on the stretcher. A seriously ill patient should never be left in the hands of untrained personnel. A female patient should never be left with a male attendant.

Reception of Patient

The GDA admitting the patient should introduce himself/herself and greet the patient and his relatives with friendliness, making special efforts to establish an effective relationship. The behaviour should be such that the patient gains the confidence and cooperation of the patient.

A sick patient should be put to bed immediately. The relatives should be treated with courtesy and given due considerations, which should be consistent with the hospital regulations. The patient who is not very ill is allowed to move about and can be taken for a round in the ward. The GDA should introduce patients to nursing personnel working in the ward and make him/her aware of the facilities, including ward, duty room, toilet and the unit prepared for him.

After making the patient seated comfortably, the GDA should explain the hospital policies, procedures and routines to the patient and his relatives. Most hospitals will have small booklets supplied to all patients on admission which will explain the hospital rules and policies. He/should also inform the time for the meal servings, the doctor's visit, the prayer service time, if any, and other hospital routines. The GDA should guide the patient's relatives in paying the hospital bills. Most of the hospitals put restrictions regarding the visiting time of the patients and the number of visitors. The relatives may be permitted to remain until the patient has been comfortably settled in the ward. Diet pass or stay pass, if any, should be given to the relatives and they should be renewed in time. The patient on self diet has to be explained about the type of the diet to be taken and the hours during which it can be brought to the hospital.

Preliminary Observation of Patient

The first few moment of contact with a new patient will reveal a great deal about him to an observant GDA. The patient's general facial expression will denote not only his emotional reactions but the presence of pain or fatigue. Any decolouration of the skin, such as jaundice or cyanosis, facial paralysis, nourishment etc. is noted without difficulty. Further observations can be made while giving care to the patient.

Helping Patient to Occupy Bed

A closed bed is converted to an open bed on admission of the patient. The patient brought by trolley should be transferred to the bed with assistance. His temperature, pulse and respirations are recorded at the time of admission and later on at regular intervals. Check the doctor's orders that are to be carried out immediately. Record the inpatient chart, the date and time of admission, condition of the patient and the observation made on the patient.

Exercise

- 1. Visit a nearby hospital and fill the patient admission form given below:

PATIENT ADMISSION FORM		Date:
1. Patient's name: _____		
2. Gender: Male/ Female: _____		
3. Date of Birth: _____		
4. Patient's Address: _____		
5. Contact number: _____		
6. Date of amission: _____		
7. Time of Admission: _____ a.m./p.m.		
8. Casualty Observed: _____		
9. Referred by Dr. _____		
10. Referred to Dr. _____		

11. Is Police Intervention required? Yes/No: _____

12. Room/Ward Type: _____

13. Room/Ward Number: _____

14. Admitted by stretcher/wheel chair: _____

15. Weight: _____ Height: _____

16. Temperature: _____ Pulse: _____ Blood Pressure: _____

17. Admitted by (name and contact no. of the person with patient) _____

2. Perform the following role play in the class under the guidance of your teacher:
Mr. Sharma is a patient who has arrived to the hospital reception and is having a problem of recurrent chest pain. He is blind and need prompt admission in the hospital. Act according to the patient"s needs and in compliance with hospital norms and standard operating procedure.

Assessment

A. Short Answer Questions:

1. Describe the responsibilities of GDA in admitting the patient in the hospital?
2. List the common medical examinations performed while admitting the patient
3. What are the various equipment need for transporting a patient?

B. Fill in the blanks:

1. A female patient should never be left with a _____ attendant.

2. _____ admission means that the patients are admitted for investigations and planned treatments and surgeries.

3. After making the patient to be seated comfortably, explain the hospital's _____ to the patient and his/her relatives.

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1 Routine admission and emergency admission.
- 2. Recording personal data and medical data.
- 3. OPD & IPD

Part B

Discussed in class the following:

- 1. Role of GDA in transporting patient from OPD to IPD.
- 2. Medical examination performed during
- 3. Role of GDA in reception of a patient.

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Demonstrate the knowledge of admitting patient in hospital		
Demonstrate the knowledge of transportation of patient from OPD to IPD		
Demonstrate the knowledge of patient"s personal and medical data		

Session 2: Health Assessment

In this session, you will learn about the purpose and procedure of health assessment. You will also study the significance and effective ways of obtaining the patient's health history and family health history. Health assessment is very important in any health care setting. The two components of a health assessment are health history and physical assessment.

Relevant Knowledge

Purpose of Health Assessment

1. To establish a database of the patient's normal abilities, risk factors that can contribute to dysfunction and any current alteration in function.
2. To get a clear picture of the patient's health status and health related problems.
3. To plan strategies to encourage continuation of healthy patterns, prevent patient health problems and alleviate or manage existing health problems.
4. To get a holistic view of the patient's health.
5. To help formulate a conclusion or problem statement.

Thus, an accurate assessment provides an essential foundation for the care of the patient.

Conducting a Health Assessment

1. Reviewing general information: It is good to collect some general information about the patient using secondary data sources. Patient's name, age, current medical history, treatment, etc. can be collected from secondary sources. Primary data is gathered from the patient.
2. Consideration of the culture: Cultural sensitivity is important when conducting a health assessment.
3. Preparation of the patient: The patient's physiological and psychological needs should be considered before and during the health assessment. The GDA should explain to the patient about the process and what to expect during assessment. This will help to reduce the anxiety and will make the patient comfortable.
4. Preparation of the environment: The environment must be comfortable for both GDA and the patient. A warm, quiet, well-lit room is ideal. All the needed equipment in full functional capacity must be available.
5. Organizing and documenting: Document pertinent information obtained during the interview.
6. Introduction to the patient: The GDA must introduce herself / himself before starting the interview.
7. Health History: It is a collection of subjective data that provides a detailed profile of the patient's health status. While collecting information on the health history, the GDA must be professional, concerned, and attentive throughout the interview.

When the patient responds to a question, the GDA should convey interest by maintaining eye contact, and occasionally nod or verbally respond to remarks. Non-verbal behaviour, particularly the body language, can convey a strong message during an interview. Throughout the interview, the GDA must evaluate his / her verbal and non-verbal message and try to improve it. During the interview, the GDA obtains information about the patient's health history and family health history. A health history is a collection of subjective data that provides a detailed profile of the patient's health status. A full general history is taken with the object of recording any condition or abnormality that may affect the health of the individual. History taking includes the following.

1. Biographic data: Name, address, gender, age, marital status, occupation, religious preferences, health care financing, primary healthcare provider, family income educational qualification, etc.
2. Chief complaints: Document in patient's own words.
3. History of present illness: Onset, signs and symptoms, duration, treatment taken if any, for the same. Other complaints, such as loss of appetite, insomnia, disorders of stomach, etc. also should be found out. The GDA should also find out the patient's health habits – eating, sleeping etc.
4. Past medical history: Childhood illness – mumps, measles and so on. Information on allergies, mental disease, accidents, injuries, surgeries should also be collected.
5. Family history: Information about all family members (father, mother, grandparents, brothers and sister) living or dead, cause of death (if dead) condition of their health (if living) family history of any illness, e.g. Diabetes mellitus, cancer, heart disease, etc.
6. Lifestyle / high risk behaviour: Smoking alcoholism, substance abuse, if yes, how much and since when? Food habits. Food likes and dislikes, pattern of sleep, exercise pattern, etc.
7. Obstetrical history: Menstrual history, history of pregnancy, labour, and puerperium and their complications.

Exercise

1. Visit a nearby hospital and conduct patient's health assessment and fill the given details.

1.	Name of the Patient
2.	Address
3.	Date of Birth
4.	Gender
5.	Casualty Observed
6.	Does the patient have any religious/cultural needs? Yes/No
7.	Physiological needs of the patient
8.	Psychological needs of the patient
9.	Name of Doctor teaching the patient

2. Visit a nearby hospital and collect health history of a patient in the table below:

Patient's Personal Information	
Name of Patient	
Address	
Date of Birth	
Gender	
Casualty Observed	

Health History	
Do you have or have you ever had any of the following?	
Asthma Yes/ No. Since/when?	
Chronic or productive cough (bronchitis or bronchiectasis) Yes/ No. (Describe duration, colour and amount)	
High blood pressure Yes/ No. (How long?)	
Chest pain, angina or heart attack Yes/ No. (Which/when?)	
Heart disease, artificial valve or pacemaker Yes/ No. (Which/when?)	
Blood disorder (e.g. leukaemia or anaemia) Yes/ No. (What type/when?)	
Blood transfusion Yes/ No. (Since When?)	
Diabetes Yes/ No.	
Hepatitis, jaundice or cirrhosis Yes/ No. (What type/when?)	
Kidney disorder Yes/ No. (What type/when?)	
Stroke (Yes/ No)	
Other serious illness or disabling condition (Yes/ No)	
Is the patient suffering from anxiety, depression or emotional disorders? (Yes/ No)	
Is the patient suffering from any allergy (drugs/food/tapes) ? Yes/ No. (To what?)	

Assessment

A. Short Answer Questions:

1. What is the purpose of health assessment?

2. What are the major components of obstetrical history?

3. What is the importance of culture in health assessment?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Present and past illness history.
- 2. Biographic data and health history of patient.
- 3. Physiological needs and Psychological needs of patient.

Part B

Discussed in class the following:

- 1. Procedures of health assessment
- 2. Health Parameters to be considered while obtaining patient's health history.

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Assess the health of a patient		
Effectively record the health history of a patient		

Session 3: Physical Examination of Patient

In this session, you will learn about the significance and purpose of physical examination of patient. You will also study the various techniques of examination.

Relevant Knowledge

A physical examination of patient is done to check the overall health and to make sure that the patient does not have any medical problems that he/she is unaware of.

Purpose of Physical Examination

- To understand the physical and mental well – being of the patients
- To detect disease in its early stage.
- To determine the cause and the extent of disease.
- To understand any changes in the condition of disease or any improvement or regression.
- To determine the nature of the treatment or nursing care needed for the patient.
- To safeguard the patient and his family by noting the early signs, especially in case of a communicable disease.
- To contribute to the medical research.
- To find out whether the person is medically fit or not for a particular task.

Techniques of Physical Examination

The four basic techniques used in physical examination are as follows:

(i) Inspection

It is the systematic visual examination of the patient or it is the process of performing deliberate purposeful observations in a systematic manner. It involves observation of the colour, shape, size, symmetry, position and movements. It also uses the senses of smell to detect odour, and sense of hearing to detect sounds.

Inspection begins with the initial contact with the patient and continues through the entire assessment. The optimal conditions for effective inspection are full exposure of the area and adequate lighting.

General inspection of a patient focuses on the following areas.

- Overall appearance of health or illness.
- Signs or distress.
- Facial expression and mood.
- Body size.
- Grooming and personal hygiene

Besides being used in general survey, inspection is the first method used in examination of a specific area. The patient and abdomen are inspected before palpation and auscultation.

(ii) Palpation

It is use of the hands and fingers to gather information through touch. It is the assessment technique which uses sense of touch. It is feeling the body or a part with hands to note the size and position of the organs.

The hands and fingers are sensitive tools and can assess temperature, turgor, texture, moisture, vibrations, size, position, consistency, masses and fluid. The dorsum surfaces of the hand and fingers are used to measure temperature. The palmar surfaces of the fingers and finger pads are used to assess texture, shape, fluid, size, consistency and pulsation. Vibration is palpated best with the palm of the hand.

The GDA hands should be warm and the touch should be gentle and respectful. Areas of tenderness are palpated last. Light, moderate, or deep palpation may be used. The purpose of deep palpation is to locate organs determine their size and to detect abnormal masses in the body.

(iii) Percussion

It is the examination by tapping the fingers on the body to determine the condition of the internal organs by the sound that are produced. Percussion is the act of striking one object against another to produce sound. The sound waves produced by the striking action over body tissues are known as percussion tones or percussion notes. Percussion tone provides information about the nature of an underlying structure. It is used to outline the size of an organ, such as bladder or liver. Percussion is also used to determine if a structure is air-filled, fluid-filled or solid.

There are two types of percussion, direct and indirect. Direct percussion is accomplished by tapping an area directly with the finger tip of the middle finger or thumb. Indirect percussion involves two hands. The hand is placed on the area to be percussed and the finger creating vibrations that allows discrimination among five different tones. The degree to which sound propagates is called resonance. Percussion produces five characteristic tones: tympanic, hyper-resonant, resonant, dull and flat. Percussion of the abdomen is tympanic, hyper- inflated lung tissue is hyper resonant, normal lung tissue is resonant, the liver is dull and the bone flat.

(iv) Auscultation

It is the process of listening to sounds that are generated within the body. Auscultation is usually done with the help of a stethoscope. The heart and blood vessels are auscultated for circulation of blood; the lungs are auscultated for moving air gastrointestinal contents. When auscultating a part, that area should be exposed, and should be quiet.

Four characteristics of sound are assessed by auscultation:

- 1. Pitch (ranging from high to low).
- 2. Loudness (ranging from soft to loud).
- 3. Quality (gurgling or swishing).
- 4. Duration (short, medium or long).

Exercise

Role Play

Mr. Agrawal is a diabetic patient and having severe chest pain. Act as a General Duty Assistant to perform the physical examination of Mr. Agrawal using different techniques.

Assessment

A. Short Answer Questions:

- 1. What is physical examination?

- 2. What is the significance and purpose of physical examination?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Palpation and percussion.
- 2. Auscultation and manipulation
- 3. Health assessment and physical assessment

Part B

Discussed in class the following:

- 1. Various techniques of physical examination.
- 2. Purpose of physical examination

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Perform physical examination of the patient		
Use different techniques of physical examination		

Session 4: Assisting in Examination of Patient

In this session, you will learn about the assistance provided by GDA in various examinations of the patient viz. eyes, ears, nose, throat, neck, chest, etc.

Relevant Knowledge

Measuring Height and Weight

To measure the length of the baby who cannot stand, place the baby on a hard surface, with the soles of the feet supported in an upright position. The knees are extended and the measurement is taken from the soles of the feet to the vertex of the head. The head should be in such a position that the eyes are facing the ceiling.

After a child can stand, the height can be measured. If the child stands with the heels, back and head against a wall, a small flat board held from the top of the head to the wall will give an accurate measure of the height that is the distance from the floor to the board.

The weight of a person who can stand is generally measured by a standing scale. The patient stands on the platform and the weight is noted on the dial. 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. It is important to weigh a baby unclothed or to weigh the clothes separately and subtract this weight.

Measuring Skull Circumference

The skull is measured at its greatest diameter from above the eyes to the occipital protuberance.

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 one of inspection 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.

Examination of Ears

The patient may be placed either in a lying or sitting position with the ear turned towards the examiner. Equipment used for the examination are a head mirror, ear speculum of various sizes, cotton tipped applications and autoscope. Tuning fork is used to test the hearing. A child needs to be carefully restrained during the examination. Young children sit on their mother's lap with their legs restrained between the mother's knees and their arms held against their back. The mother then holds the child's head against her chest. Very small infants can be laid on the examination table.

Examination of Nose, Throat and Mouth

The patient is usually seated with the head resting against the back of the chair. For the examination of the throat, a tongue depressor and a good light are needed. For examination of the nose, a nasal speculum and a head mirror are used. Sometimes the autoscope is also used.

Examination of Neck

The neck needs to be palpated for lymph nodes. In order to assess the thyroid glands, the patient is asked to swallow saliva.

Examination of Chest

While examining the anterior chest, the patient is placed in a horizontal recumbent position. The chest is examined in several ways. It is percussed to determine the presence of fluid or congested areas. The physician listens to the sounds within the chest by means of a stethoscope. To examine the posterior chest, the patient is placed in a sitting position. The heart and lungs are examined by percussion and auscultation. The breasts are examined by palpation for the presence of lumps or growths. The axillae are palpated for enlarged lymph nodes. During the examination, the patient's face is turned away from the doctor.

Examination of Abdomen

The abdomen is examined while the patient is in dorsal recumbent position and the knees are slightly flexed to promote relaxation of the abdominal muscles. The abdomen is inspected, palpated, auscultated and percussed to detect any abnormalities.

Examination of Extremities (Arm and Legs)

Extremities are inspected, palpated and moved. A fine tremor suggestive of hyperthyroidism can be observed, if the patient is asked to hold the arms out in front of him for a few minutes. A pitting oedema may be observed at the ankle joint by pressing the skin against the bone. Varicose veins may be observed on the posterior part of the leg over the calf muscles. The joints are moved in all directions to assess the movements of the joints.

Examination of Spine

In a standing position the spine is examined for abnormal curvature. The fingers are moved over the spine to detect the spina bifida in a newborn infant.

Examination of Genitalia

The patient is placed in a dorsal recumbent or lithotomy position. For the examination of the female genitalia, clean rubber gloves, vaginal speculum, a good source of light and a lubricant are necessary. The abnormalities of the vulva, vagina, cervix, uterus and the ovaries are detected. The inguinal region is palpated for the enlarged lymph nodes.

Examination of Rectum

To examine the rectum and anus, the patient is placed in a dorsal recumbent or left lateral position. Initially the anus is observed for the haemorrhoids, fissures or cracks. If the patient is asked to bear down, as if to defecate, the internal haemorrhoids may become visible. To examine the rectum, a clean glove (a finger cot may be sufficient), proctoscope, lubricant and a good source of light are necessary.

Exercise

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

Particular	Observation
Height	
Weight	
Eyes	
Ears	
Nose	
Throat	
Neck	
Chest	
Abdomen	
Arms	
Legs	
Spine	

Assessment

A. Short Answer Questions:

1. What is the procedure of examination of ears a patient?
2. What are the techniques of physical assessment used in abdomen examination?
3. What technique is used for chest examination?
4. What are the precautions to be taken while examining height and weight of the patient?

B. Fill in the blanks:

1. The abdomen is examined while the patient is in position and the are slightly flexed to promote relaxation of the abdominal muscles.

2. While examining the anterior chest, the patient is placed in a position.

3. What technique is used for chest examination?

4. What are the precautions to be taken while examining height and weight of the patient?

B. Fill in the blanks:

1. The abdomen is examined while the patient is in _____ position and the _____ are slightly flexed to promote relaxation of the abdominal muscles.
2. While examining the anterior chest, the patient is placed in a _____ position.
3. The weight of a person who can stand is generally measured by a _____ scale and the weight is taken without .
4. In a standing position the spine is examined for _____

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

1. Assessment techniques of measuring height and weight.
2. Horizontal and vertical position of the patient.

Part B

Discussed in class the following:

- 1. Examination of extremities (arms and legs).
- 2. Role of GDA in assisting health examination of a patient.

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Identify various positions of the patients while health examination		
Demonstrate the knowledge of conducting examination of eyes, ears, nose, throat, neck, chest, etc.		

Session 5: Collection of Specimen

In this session, you will study about the specimen collection methods for urine, stool, sputum, blood, etc.

Relevant Knowledge

Collecting Urine Specimen

1. Method of collecting single urine specimen

Single urine specimen means the amount of urine voided at a time. Usually the morning specimens are collected. An amount of 100 to 120 ml urine will be sufficient for the usual tests. After cleaning the genital area, the patient passes urine into clean urinal or a clean kidney tray or directly into the specimen bottle, taking care not to spill the urine on the outside of the container.

2. Method of Collecting Midstream Specimen for Culture

Ask the patient to clean the genital area with soap and water and then rinse with water alone. In female patients, the labia are separated for cleaning and kept apart until the urine had been collected. In male patients, the foreskin should be retracted and the glans penis is cleaned before the collection of the urine.

The patient begins to void into the toilet, commode or bed pan. Then the patient stops the stream of urine, the sterile container is positioned and continues to void into the container. When enough urine has been voided for specimen, the patient stops the stream again; the container is removed and then finishes voiding in the original receptacle. By this method, the first stream of urine flushes out the organisms and mucus usually present at the meatus, so that accurate result can be obtained.

Catheterization may be necessary to get specimens from unconscious patient or menstruating patients. As far as possible the catheterization is avoided as it may cause urinary infection due to the introduction of micro-organisms along with the catheter into the urinary tract or it may cause tissue trauma.

3. Method of collecting 24 hours Urine Specimen

Twenty – four hours urine specimen means to collect all the urine voided in 24 hours. Collection of urine begins at 06 A M ask the patient to void at 06 A M and discard the whole urine. All the subsequent voiding should be measured and collected in the bottle which is labeled. Continue to collect till next morning. Ask the patient to 06 A M on the next day and add it to the urine previously collected.

It is necessary to add preservatives to the urine to prevent decomposition and multiplication of bacteria. A variety of preservatives are available, such as toluene, boric

acid concentrated hydrochloric acid, formalin, chloroform, etc.

Collection of Stool Specimen

Waterproof disposable containers or wide – mouthed containers are provided with necessary instructions. The patient passes stool in a clean bedpan. A small amount of stool is removed with a stick or spatula and is placed in the container. Discard the stick in the waste bin.

Collection of Sputum Specimen

Waterproof disposable sputum sups or wide mouthed containers are used to collect sputum specimen. A large container is required if the physician desires to have the total sputum expectorated in 24 hours. If sterile specimens are desired, a wide – mouthed sterile glass bottle with a screw cap or a sterile petri dish can be used.

The patient should be given the container on the previous evening and is instructed to raise the material from the lungs by coughing and not simply expectorating the saliva or discharges from the nose or throat. The sputum should be collected in the morning before brushing the teeth and taking the food. Mouth can be rinsed with plain water and not with any antiseptic mouth washes.

To collect the sputum from a young child, use a cotton applicator and a test tube. When the sputum is coughed up, wipe off the sputum with cotton applicator and is dropped into the clean test tube. Close the test tube with a cotton plug.

Collecting Vaginal Discharge

Vaginal smears are made sent to the laboratory for the examination of the vaginal discharge. Minimum two slides with smears should be sent to the laboratory. Two clean slides and a wire loop or a cotton applicator are required. The glass slides are cleaned with spirit. With the wire loop or cotton applicator take the vaginal discharge and smear it on one side of the slide and make a thin film over the slides. Dry the slides and send them to the lab.

Collecting Blood Specimen

Blood specimens are usually collected by the laboratory technicians. Occasionally, the GDA are held responsible to collect the blood. It depends upon the hospital routines. Blood should be collected with aseptic techniques. It should be collected with dry syringe or with a syringe rinsed in saline solution to prevent haemolysis of blood. For certain test, fasting blood should be collected.

Exercise

1. Visit a nearby hospital and assist in collection of blood specimen of the patient.
2. Prepare a chart of the pre requisites of collecting specimen of blood, urine and stool.

3. Tabulate the safety measures to be adopted while collecting the various specimen of the patient.

Assessment

A. Short Answer Questions:

1. What is the technique used in sputum specimen?

2. How do you collect stool specimen?

3. Explain the method of collecting urine specimen

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Single urine specimen method and 24 hours urine specimen method.
- 2. Collecting blood specimen and urine specimen.

Part B

Discussed in class the following:

- 1. Methods of urine specimen collection.
- 2. Equipment/instruments required for collecting blood/stool/urine specimen

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Collect the urine specimen of the patient		

Session 6: Furnishing Patient's Unit

In this session, you will learn about the role of GDA in furnishing the patient's unit using various equipment and supplies. You will also study the bedding standards while taking care of the patient.

Relevant Knowledge

Furnishing for the Patient's Unit

Patient's unit is the area furnished and equipped according to the necessity for the care of the patient. Units vary in size. It may be a private unit which includes a living room, a bedroom, a bathroom and a latrine or a single room with furnishings and supplies for the care of one patient or it may be the immediate surroundings of patient in a general ward where several patients are looked after.

Most of the equipment and supplies needed for the patient care are kept in the patient's unit. These include the following:

- (i) **Cot or bedstead:** The standard hospital beds available are made of metal. It is simple in design, light and easily movable, easy to handle and clean, and strong and durable. Hard rubber castors make it possible to move the bed without jarring the patient. Some beds may have devices to adjust the position of the patient at the head, knees and at the foot end. A standard hospital bed is 78 inch long, 38 inch wide and 28 inch high from the floor. The height of the bed is such that physician and GDA may have convenient access to the patient without undue fatigue and strain. Some beds will have side rails to prevent the patient from falling.
- (ii) **Overbed table:** The patient can use the overbed table or cardiac table for activities, such as eating, reading, writing and for placing articles for self-care. It is useful for the GDA to place articles while giving care to the patient.
- (iii) **Bedside locker:** The bedside locker is used to store the patient's personal articles. It should be placed within the easy reach of patient. Articles can be kept on and inside the bedside locker.
- (iv) **Bedside table:** The patients who are allowed to move about can use the bedside table for taking the meals.
- (v) **Chair and stool:** Most of the patient's units have at least one straight back chair (with or without arms) and a stool. The workers and visitors should sit on the chair and not on the patient's bed. The chair seat is used for the placement of clean linen, while changing the bed linen or bathing the patient. The patient can make use of the chair or stool when he is outside the bed.
- (vi) **Bedside commode:** Bedside commode is a chair or wheel chair that has an opening in the centre of the seat under which a bedpan can be inserted. The bedside commode is preferred to bedpan because the patient can be

seated in a sitting position during defecation and urination, a position most comfortable for the patient.

- (vii) **Bedpans and urinals:** For a patient confined to bed, bedpans and urinals are used for defecation and urination.
- (viii) **Sputum cup:** Sputum cups are used to collect the sputum and spittings.
- (ix) **Kidney trays:** Kidney trays are usually used for collecting the vomits (so it is also called emesis tray) soiled dressings or collecting of body fluids. \
- (x) **Water flasks and drinking glasses:** The water flask is filled with drinking water and is given to the patient within his reach.
- (xi) **Plate, spoon, fork, and knives:** These are used to serve meals to the patients and are kept in the patient"s unit.
- (xii) **Call signal:** A bell is usually kept near the patients for calling the GDA.
- (xiii) **Toilet articles:** Soap and soap dish, toothbrush and tooth paste, mouth wash, comb, etc., are kept in the patient"s unit.
- (xiv) **Waste basket:** it is used to collect the rubbish.
- (xv) **Bucket and mug:** These are kept in the bathing room for taking bath.

Bedding and Bed Linen

Mattress: Mattresses used for the patient should be firm, thick and smooth. It gives support to the patients. Mattresses are made by filling with horse hair, coir, air and water. All these should have a washable cover.

Pillow: Pillows are usually made out of strong cotton with standard size of 60 cm long, 45 cm wide and 10 cm thick.

Sheets: The bed sheets are made of strong cotton material. They are used to protect the mattress from soiling and to cover the patient. They should be sufficiently long and wide to tuck in well at the head, foot and sides. Standard size is 108 inches long and 76 inches wide.

Draw mackintosh and draw sheet: They are drawn from side to side and usually extends from the patient"s shoulders to below knees. Draw mackintosh is a waterproof sheeting made up of either rubber or plastic material. It is used to protect the mattress and the bottom sheet from soiling. It is uncomfortable for the patient, if it is used without lining because it is not a good conductor of heat. Sometimes a "Kelley"s pad" is used in the place of a mackintosh. It is a mechanical device made up of rubber and is used to protect the bed and the bed linen from getting wet, while giving bed shampoo for a bedridden patient.

Pillow cases: Pillow cases are used to protect the pillows. They should be bigger than the size of the pillow for the easy insertion lest they destroy the shape of the pillow. The average size is 65 cm long and 50 cm wide.

Blanket: Blanket are usually made up of woollen material. It should be light and warm. It is used to protect the patient from cold. Blanket irritates the skin so it should never be placed next to the patient. Protect the blankets with blanket covers or with sheets.

Bedspread or counterpane: It is used to give a neat appearance to the bed. It protects the blankets and the bed as a whole from dust. Generally the size of a bedspread is 3m long and 3m wide.

Exercise

1. Visit a nearby hospital and observe the equipment and supplies in different wards/ units needed for the patient's care. Prepare a survey report containing the list of the equipment and supplies found on the basis of type of the unit and the health status of the patient.
2. Visit a nearby hospital and prepare a chart of the standard size of mattress, pillow, bed sheets, blankets and bedspread.

Assessment

A. Short Answer Questions:

1. Enlist the equipment and supplies needed for patient's care?

2. Enlist the articles used in toilet for patient care?

3. What are the articles used for bedding and bed linen?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

1. Bed side table and cardiac table.

Part B

Discussed in class the following:

- 1. Equipment and supplies needed for patient care in a hospital.
- 2. Standards of bedding and bed linen

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Prepare the patient unit according to patient's needs		
Identify the different equipment used for patient comfort		

Notes

This image shows a full page of blank, lined paper. It features approximately 20 evenly spaced horizontal grey lines across its entire width, providing a guide for handwriting or typing. The paper itself is a clean, off-white color.

Sector: **Healthcare**

NSQF Level 3; Class XI
HSS302 - NQ2014
Drug Delivery System

Student Workbook

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Session 1: Introduction to Drug Delivery System

In this session, you will learn about the different types of drug delivery system operated in the hospital. You will also study the advantages and disadvantages of the various conventional drug delivery systems.

Relevant Knowledge

Drug delivery is the method or process of administering a pharmaceutical compound to achieve a therapeutic effect in humans. Drug delivery refers to approaches, formulations, technologies, and systems for transporting a pharmaceutical compound in the body as needed to safely achieve its desired therapeutic effect. It may involve scientific site-targeting within the body or it might involve facilitating systemic pharmacokinetics; in any case, it is typically concerned with both quantity and duration of drug presence. Drug delivery is often approached via a drug's chemical formulation, but it may also involve medical devices or drug-device combination products.

Types of Drug Delivery Systems

Drug delivery technologies modify drug release profile, absorption, distribution and elimination for the benefit of improving product efficacy and safety, as well as patient convenience and compliance.

Various types of drug delivery systems are:

1. Conventional Drug Delivery System
2. Novel Drug Delivery System
 - a. Targeted Drug Delivery System
 - b. Controlled Drug Delivery System
 - c. Sustained / Modified Release Drug Delivery System
 - d. Other Dosage Forms

Conventional Drug Delivery System

Conventional drug delivery system or the traditional system is the one that incorporates the classical methods for the delivery of Drug into the body. Examples of these systems include the following:

- Oral Delivery
- Buccal / Sub-lingual Delivery
- Rectal Delivery
- Intravenous Delivery

- Sub-cutaneous Delivery
- Intramuscular Delivery

Oral Delivery

Advantages of Oral Delivery

- Convenience in administration
- Non-invasive
- Accurate and measured dose.
- Unit dosage form
- Higher compliance
- Unit dosage formzs
- Cheap

Disadvantages of Oral Delivery

- Unconscious patients cannot take dose
- Low solubility
- Low permeability
- Degradation by gastro-Intestinal enzymes or flora
- First pass metabolism
- Food interactions
- Irregular absorption

Examples of medicines given through oral delivery system:

- Tablets
- Capsules
- Soft gelatin capsules
- Suspensions
- Elixirs

Buccal / Sublingual Delivery

Advantages

- By-pass first pass metabolism
- Rapid absorption
- Low enzymatic activity

Disadvantages

- Discomfort during dissolution
- Probability of swallowing
- Small doses

Examples:

- Tablets
- Chewing gum

Rectal Delivery

Advantages

- By-pass first pass metabolism
- Useful for children

Disadvantages

- Absorption depends on disease state
- Degradation by bacterial flora
- Uncomfortable

Intravenous Delivery

Advantages

- Drug 100% bioavailable
- Rapid response
- Total control of blood concentration
- Maximize incorporation of degradable drugs
- By-pass First Pass Metabolism

Disadvantages

- Invasive
- Trained personnel are needed
- Possible toxicity due to incorrect dosing
- Sterility

Subcutaneous Delivery

Advantages

- Patient self-administration
- Slow, complete absorption
- By-pass first pass metabolism (FPM)

Disadvantages

- Invasive
- Irritation
- Inflammation
- Maximum dose volume - 2mL

Intramuscular Delivery

Advantages

- Patient can administer the drug himself
- Larger volume than subcutaneous
- By-pass first pass metabolism

Disadvantages

- Invasive – patient discomfort
- Irritation,
- Inflammation
- May require some training

Exercise

Visit a nearby hospital and identify the different drug delivery methods. Write the examples of drugs given by a particular method and fill the table given below:

Drug Delivery Method	Example of drugs
Oral	
Sublingual	
Subcutaneous	
Intramuscular	
Intravenous	

2. Prepare a comparative chart of the various drug delivery methods. Also include their advantages and disadvantages.

Assessment

A. Short Answer Questions:

1. What is drug delivery?

2. List the various types of conventional drug delivery system?

3. Explain the intravenous drug delivery method?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Classical and modern method of drug delivery methods.
- 2. Oral and transdermal drug delivery.
- 3. Subcutaneous and intramuscular drug delivery.

Part B

Discussed in class the following:

- 1. Selection of drug delivery method
- 2. Advantages of oral drug delivery method

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Demonstrate the knowledge of various drug delivery methods		
Identify different drug delivery methods		

Session 2: Patient's Safety and Effectiveness in Drug Delivery

In this session, you will learn the general practices to be deployed for patient's safety while delivering the drugs. You will also study various sources of hazards to patient's safety in hospital and the harm caused by the health-care errors and system failures.

Relevant Knowledge

There is now overwhelming evidence that significant numbers of patients are harmed from their healthcare either resulting in permanent injury, increased length of stay (LOS) in hospitals and even death. We have learnt over the last decade that adverse events occur not because bad people intentionally hurt patients but rather that the system of health care today is so complex that the successful treatment and outcome for each patient depends on a range of factors, not just the competence of an individual health-care provider. When so many people and different types of health-care providers (doctors, nurses, pharmacists, social workers, dieticians, GDA and others) are involved, this makes it very difficult to ensure safe care, unless the system of care is designed to facilitate availability of timely and complete information and understanding by all the health professionals.

Many of the features of patient safety do not involve financial resources; rather, they involve commitment of individuals to practice safely. Individual doctors and nurses can improve patient safety by engaging with patients and their families, checking procedures, learning from errors and communicating effectively with the health-care team. Such activities can also save costs because they minimize the harm caused to patients. When errors are reported and analyzed, they can help identify the main contributing factors. Understanding the factors that lead to errors is essential for thinking about changes that will prevent errors from being made.

Healthcare Errors and System Failures

Even though the extent of adverse events in the health system has long been recognized, the degree to which they are acknowledged and managed varies greatly across health systems and across health professions. Poor information and understanding about the extent of harm, and the fact that most errors do not cause any harm at all, may explain why it has taken so long to make patient safety a priority. In addition, mistakes affect one patient at a time and staff working in one area may only experience or observe an adverse event infrequently. Errors and system failures do not all happen at the same time or place, which can mask the extent of errors in the system.

Patient's Safety

The urgency of patient safety was raised over a decade ago when the US Institute of Medicine convened the National Roundtable on Healthcare Quality. Since then the debate and discussions about patient safety worldwide have been informed by lessons

arnt from other industries, the application of quality improvement methods to measure and improve patient care and the development of tools and strategies to minimize errors and failures. All of this knowledge has strengthened the place of the safety sciences in the context of medical practice and health-care services. The need to improve healthcare through redesigning processes of care has been acknowledged by WHO and its representative countries as well as by most health professions.

Sources of Hazards to Patient's Safety in Hospitals

- Electronic Devices
- Invasive devices
- Miscommunication
- Electrical Devices
- Pharmaceutical Incompatibilities

Exercise

1. Visit a nearby hospital to identify the patient safety measures in drug delivery and fill the below table accordingly:

Drug Delivery System	Sources of hazards	Patient's safety measures adopted

2. Visit a nearby hospital and observe the various personal protective equipment used by the health professionals and supporting staff while administering medicines to patient"s body. Enlist five such protective equipment.

Assessment

A. Short Answer Questions:

1. What are the sources of hazards in patient"s safety in different drug delivery systems?
- _____
- _____
- _____
2. What is the role of GDA in maintaining patient"s safety in drug delivery system?
- _____
- _____
- _____

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Healthcare error and system failure

Part B

Discussed in class the following:

- 1. Sources of hazards in patient"s safety
- 2. Role of GDA in patient"s safety
- 3. Harm caused by the health care errors and system failures

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Identify safety measures adopted in the hospital		
Identify the sources of hazards		
Demonstrate the knowledge of patient"s safety measures		

Session 3: Routes of Administering Drugs in Patient's Body

In this session, you will learn about the different routes of administering the drugs in the patient's body. Routes of administration are usually classified by application and location (or exposition). The route or course which the active substance takes from application location to the location where it has its target effect is usually rather a matter of pharmacokinetics (concerning the processes of uptake, distribution, and elimination of drugs). Nevertheless, some routes, especially the transdermal or transmucosal routes are commonly referred to as routes of administration.

Relevant Knowledge

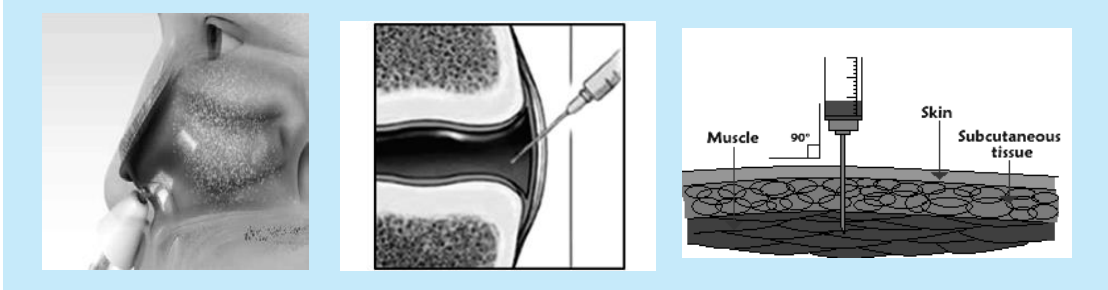
Gastrointestinal / Enteral

Administration through the gastrointestinal tract is sometimes termed enteral or enteric administration (literally meaning 'through the intestines'). Enteral/enteric administration usually includes oral (through the mouth) and rectal (into the rectum) administration, in the sense that these are taken up by the intestines. However, uptake of drugs administered orally may also occur already in the stomach, and as such gastrointestinal (along the gastrointestinal tract) may be a more fitting term for this route of administration. Furthermore, some application locations often classified as enteral, such as sublingual (under the tongue) and sublabial or buccal (between the cheek and gums/gingiva), are taken up in the proximal part of the gastrointestinal tract without reaching the intestines. Strictly enteral administration (directly into the intestines) can be used for systemic administration, as well as local (sometimes termed topical), such as in a contrast enema, whereby contrast media is infused into the intestines for imaging. However, for the purposes of classification based on location of effects, the term enteral is reserved for substances with systemic effects.

Other Locations

- Epicutaneous or topical (application onto the skin): It can be used both for local effect as in allergy testing and topical local anesthesia, as well as systemic effects when the active substance diffuses through skin in a transdermal route.
- Nasal administration (through the nose): It can be used for topically acting substances, as well as for insufflation e.g. decongestant nasal sprays to be taken up along the respiratory tract. Such substances are also called inhalational, e.g. inhalational anesthetics.
- Intraarticular (into a joint space): It is used in treating osteoarthritis
- Intracardiac (into the heart)
- Intramuscular (into a muscle): e.g. many vaccines, antibiotics, and long-term psychoactive agents.
- Intravenous (into a vein): e.g. many drugs, total parenteral nutrition.
- Subcutaneous (under the skin), e.g. insulin.
- Transdermal (diffusion through the intact skin for systemic rather than topical distribution): e.g. transdermal patches such as fentanyl in pain therapy, nicotine

patches for treatment of addiction and nitroglycerine for treatment of angina pectoris.



Exercise

1. Visit a nearby hospital and identify the drugs given with different routes. Fill the table given below with the suitable name of drug according to the route of delivery:

Route of Delivery of Drug	Name of the Drug
Enteral	
Nasal	
Intracardiac	
Intramuscular	
Transdermal	

Assessment

A. Short Answer Questions:

1. Write various routes of administering the drug in the body of the patient?
- _____
- _____
- _____
2. What is the importance of enteral drug delivery route?
- _____
- _____
- _____

B. Match the column:

S.No.	Administration Procedure	S.No.	Medical Terminology
1.	On to the skin	A.	Nasal
2.	Through the nose	B.	Intracardiac
3.	Into a joint space	C.	Subcutaneous

4.	Into the heart	D.	Topical
5.	Into the vein	E.	Intraarticular
6.	Under the skin	F.	Intravenous

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Intramuscular and intravenous route of drug delivery.
- 2. Subcutaneous and topical route of drug delivery.

Part B

Discussed in class the following:

- 1. Role of GDA in selection of route of drug delivery.
- 2. Different routes of drug administration.

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Identify the different routes of drug administration		
Demonstrate the knowledge of role of GDA in drug delivery		

Session 4: Drug Dosage Forms

In this session, you will learn about the various drug dosage forms. These are the various dosage forms that are administered to the patients for the optimum delivery of the drug in the body.

Relevant Knowledge

Tablet

A tablet or caplet is a pharmaceutical dosage form. It comprises a mixture of active substances and excipients, usually in powder form, pressed or compacted from a powder into a solid dose.

The compressed tablet is the most popular dosage form in use today. About two-thirds of all prescriptions are dispensed as solid dosage forms, and half of these are compressed tablets. A tablet can be formulated to deliver an accurate dosage to a specific site; it is usually taken orally, but can be administered sublingually, buccally, rectally or intravaginally. The tablet is just one of the many forms that an oral drug can take such as syrups, elixirs, suspensions, and emulsions. Medicinal tablets were originally made in the shape of a disk of whatever colour their components determined, but are now made in many shapes and colours to help distinguish different medicines.

Capsule

In the manufacture of pharmaceuticals, encapsulation refers to a range of techniques used to enclose medicines in a relatively stable shell known as a capsule, allowing them to, for example, be taken orally or be used as suppositories. The two main types of capsules are:

- Hard-shelled capsules, which are typically made using gelatin and contain dry, powdered ingredients or miniature pellets. These are made in two halves: a lower-diameter “body” that is filled and then sealed using a higher-diameter cap.
- Soft-shelled capsules are primarily used for oils and for active ingredients that are dissolved or suspended in oil.

Parenteral Formulations

- These are also called injectable formulations and are used for intravenous, subcutaneous, intramuscular, and intra-articular administration. The drug is stored in liquid or if unstable, it is stored in lyophilized form.
- Many parenteral formulations are unstable at higher temperatures and require storage at refrigerated or sometimes frozen conditions.

Topical Formulations

- Cream - Emulsion of oil and water in approximately equal proportions.
- Ointment - Combines oil (80%) and water (20%).
- Gel - Liquefies upon contact with the skin.
- Paste - Combines three agents - oil, water, and powder; an ointment in which a powder is suspended.
- Powder - A finely subdivided solid substance.

Exercise

1. Visit a nearby hospital and identify the different drug dosage forms. Fill the examples of particulars vehicle in the table given below:

Dosage Forms	Examples
Tablet	
Capsule	
Ointment	
Cream	
Powder	

Assessment

A. Short Answer Questions:

1. Enlist various drug dosage forms?

2. What are the criteria to choose drug dosage forms?

3. Explain two main types of capsule.

B. Fill in the blanks:

- 1. The two main types of capsules are _____ and _____
- 2. Hard-shelled capsules are generally made of _____
- 3. Many parenteral formulations are unstable at _____
- 4. Paste combines _____, _____, and _____
- 5. Ointment combines _____% oil and _____% water

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Hard shield and soft shield capsule.
- 2. Ointment and cream.
- 3. Gel and paste.

Part B

Discussed in class the following:

- 1. Use of tablet.
- 2. Role of GDA in giving drug by parental route.

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Identify the different dosage forms		
Demonstrate the basic knowledge of drug dosage formulations		

Session 5: Novel Drug Delivery System

In this session, you will learn about the various types of novel drug system and their advantages.

Relevant Knowledge

The Pharmaceutical technology has evolved drastically in the past few years and various newer and technologically advanced systems have been developed after rigorous research activities. These systems are advantageous in respect of:

- Accurate dosage
- Optimum delivery
- Target specific delivery
- Time controlled release
- Multiple dosing
- Minimal side effects

There are various types of novel drug delivery systems that have been developed. Let us now try to understand some of them.

Aerosols

- Aerosol preparations are stable dispersions or suspensions of solid material and liquid droplets in a gaseous medium.
- The drugs, delivery by aerosols is deposited in the airways by:
 - ❖ Gravitational sedimentation
 - ❖ Inertial impaction
 - ❖ Diffusion

Mostly larger drug particles are deposited by first two mechanisms in the airways, while the smaller particles get their way into the peripheral region of the lungs by following diffusion. There are three commonly used clinical aerosols:

- ❖ Nebulizers
- ❖ Metered-dose Inhaler (MDI)
- ❖ Dry-powder inhaler (DPI)

The basic function of these three completely different devices is to generate a drug-containing aerosol cloud that contains the highest possible fraction of particles in the desired size range.

Nebulizers

- Nebulizers are widely used as aerosolize drug solutions or suspensions for drug

delivery to the respiratory tract and are particularly useful for the treatment of hospitalized patients.

- Delivered the drug in the form of mist.
- There are two basic types:
 - ❖ Air jet
 - ❖ Ultrasonic nebulizer

Dry Powder Inhalers

- Dry Powder Inhalers (DPI) are bolus drug delivery devices that contain solid drug in a dry powder mix that is fluidized when the patient inhales.
- Dry powder formulations either contain the active drug alone or have a carrier powder (e.g. lactose) mixed with the drug to increase flow properties of drug.
- DPIs are a widely accepted inhaled delivery dosage form, particularly in Europe, where they are currently used by approximately 40% of asthma patients.

Metered Dose Inhalers

Metered Dose Inhalers (MDI) is used for treatment of respiratory diseases such as asthma and COPD, They can be given in the form of suspension or solution. Particle size of less than 5 microns. It is used to minimize the number of administrations errors. It can be deliver measure amount of medicament accurately.

Transdermal Drug Delivery System

Transdermal drug delivery system can deliver the drugs through the skin portal to systemic circulation at a predetermined rate and maintain clinically the effective concentrations over a prolonged period of time.

Advantages of Transdermal Drug Delivery System

- These are painless, non-adhesive way to deliver drug directly into body.
- They are useful where drugs that are breakdown by the stomach acid or extensively degraded by liver.
- Useful in controlled and steady delivery of medication over a long period of time.

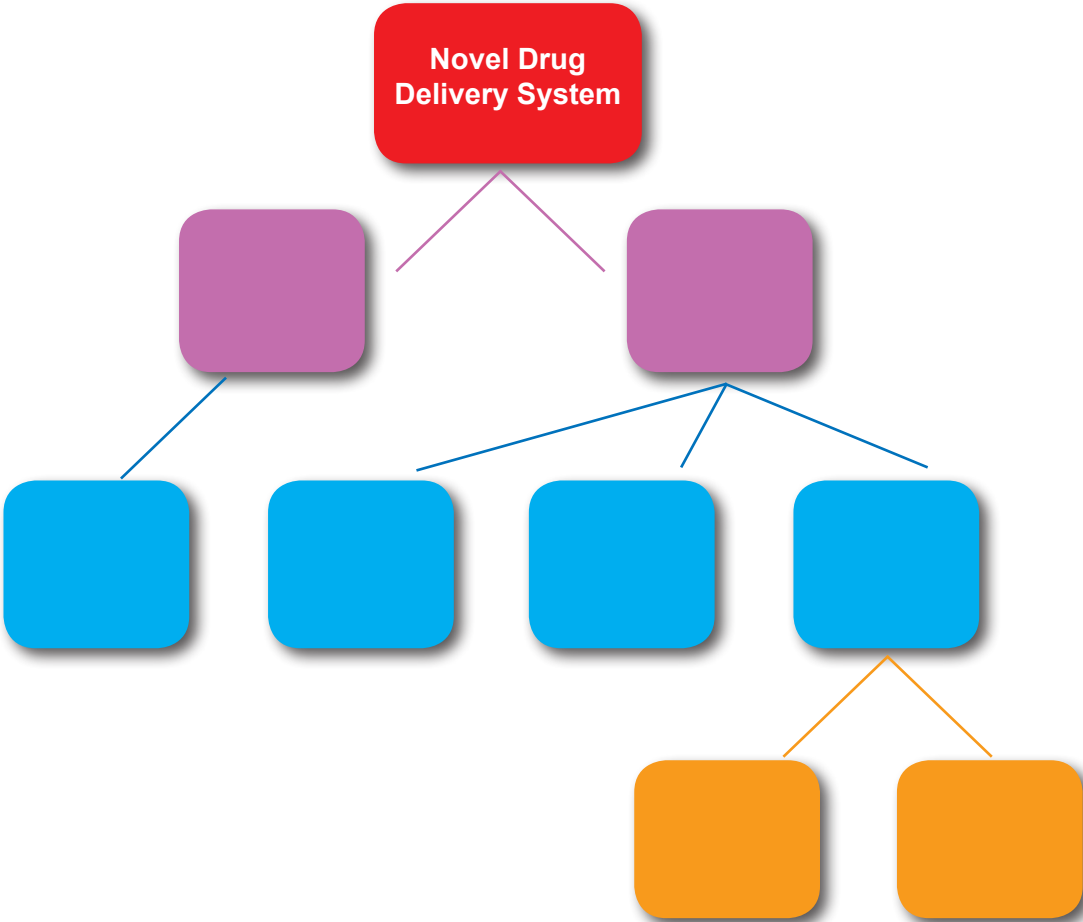


Exercise

1. Visit a nearby hospital and identify the common examples of novel drug delivery system and fill the table given below:

Novel drug delivery system	Examples
Aerosole	
Nebulizer	
Dry powder inhalation	
Metered dose inhalation	
Transdermal drugs	

2. Fill the boxes with the terms used for classification of Novel Drug Delivery system:



Assessment

A. Short Answer Questions:

- 1. What is novel drug delivery method?

- 2. What are the advantages of novel drug deliver method over conventional drug delivery method?

- 3. Write full form of DPI and MDI.

- 5. What is transdermal drug delivery system? Write its advantage.

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Dry Powder Inhalation and Metered Dose Inhalation.
- 2. Aerosols and transdermal system.

Part B

Discussed in class the following:

- 1. Classification of novel drug delivery systems.
- 2. Role of GDA in implementing novel drug delivery system practices.

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Identify different drugs given by novel drug delivery method		
Demonstrate the knowledge of classification of novel drug deliver method		

Session 6: Controlled Drug Delivery System

In this session, you will learn about the classification of controlled drug delivery system on the basis of mechanism of release.

Relevant Knowledge

Time release technology (also known as sustained-release [SR], sustained-action [SA], extended- release [ER,], timed-release [TR], controlled-release [CR], modified release [MR], or continuous- release) is a mechanism used in pill tablets or capsules to deliver a drug over time with a control over the amount with respect to time so to be released slower and steadier into the bloodstream while having the advantage of being taken at less frequent intervals than conventional dosage formulations of the same drug.

Today, most time-release drugs are formulated so that the active ingredient (ai) is embedded in a matrix of insoluble substance(s), such that the dissolving drug must find its way out through the holes in the matrix. Some drugs are enclosed in polymer-based tablets with a laser-drilled hole on one side and a porous membrane on the other side. Stomach acids push through the porous membrane, thereby pushing the drug out through the laser-drilled hole. In time, the entire drug dose releases into the system while the polymer container remains intact which is excreted through the normal digestion.

Classification of Controlled Drug Delivery System on the Basis of Mechanism of Release

Control drug release has been achieved by following classes of control drug delivery system:

- 1) Diffusion
 - a) Matrix
 - b) Reservoir
- 2) Dissolution
 - a) Matrix
 - b) Encapsulation
- 3) Combination of both Dissolution and Diffusion
- 4) Osmotic pressure control system

Diffusion Control Release Drug Delivery System

❖ Diffusion process shows the movement of drug molecules from a region of

higher concentration to one of lower concentration across the membrane.

- ❖ Commonly when a water insoluble membrane encloses a core of drug, it must diffuse through the membrane.

Reservoir System

- ❖ Also called as laminated matrix device.
- ❖ In this system, a water insoluble polymeric material encases a core of drug. Drug will partition into the membrane and exchange with the fluid surrounding the particle or tablet.
- ❖ Additional drug will enter the polymer, diffuse to the periphery and exchange with the surrounding media.
- ❖ Drug core surrounded by polymer membrane which controls release rate.

Dissolution Control Release Drug Delivery System

- ❖ These systems are most commonly employed for production of enteric coated dosage forms.
- ❖ To protect the stomach from the effects of drug such as aspirin, a coating that dissolves in alkaline media is used.
- ❖ This inhibits release of drug from the device unless it reaches the higher PH in the intestine.

Matrix Type

- ❖ Also called as Monolith dissolution controlled system.
- ❖ It can be either a drug impregnated sphere or tablet which will be subjected to slow erosion
- ❖ Dissolution is controlled by:
- ❖ Altering porosity of tablet.
- ❖ Dissolving at slower rate.
- ❖ Drug release determined by dissolution rate of polymer.

Encapsulation/Reservoir type

- ❖ Also called as Coating Dissolution Controlled System.
- ❖ Drug is coated with a given thickness coating, which is slowly dissolved in the contents of gastrointestinal tract.
- ❖ An alternative method is to administer the drug as group of beads that have coating of different thickness.
- ❖ Since the beads have different coating thickness, their release occurs in a

progressive manner.

Osmotic Pressure Control System

- ❖ A semi permeable membrane is placed around a tablet, particle or drug solution that allows transport of water into the tablet with eventual pumping of drug solution out of the tablet through a small delivery aperture in tablet coating.
- ❖ Two types of osmotically sustained systems are as follows:-
 - Type A contains an osmotic core with drug
 - Type B contains the drug in flexible bag with osmotic core surrounding.

Exercise

1. Visit a nearby hospital and identify the release of drugs of control delivery system. Prepare a report of the observation.

Assessment

A. Short Answer Questions:

1. Name the mechanisms used to deliver a drug in controlled time and amount

2. Classify the controlled drug delivery system on the basis of mechanism of release

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

1. Diffusion and dissolution controlled drug delivery system.
2. Matrix type and reservoir type control drug delivery system.

3. Type A and Type B osmotic pressure control system.

Part B

Discussed in class the following:

- 1. Classification of control drug delivery system
- 2. Role of GDA in controlled drug delivery

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Identify the common drugs used in control drug delivery system		
Demonstrate the knowledge of classification of controlled drug delivery system		

Notes

This image shows a full page of blank, lined paper. It features approximately 20 evenly spaced horizontal blue or grey lines across its entire width, typical of notebook paper. The lines are uniform in thickness and spacing, providing a guide for handwriting. There are no margins, text, or other markings on the page.

Sector: **Healthcare**

NSQF Level 3; Class XI
HSS303 - NQ2014

**Microbiology, Sterilization and
Disinfection - II**

Student Workbook

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Session 1: Introduction to Disinfection of Articles

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.

Relevant Knowledge

Concurrent Disinfection

Concurrent disinfection means the immediate disinfection of all contaminated articles and bodily discharge during the course of the disease. It includes the following:

1. Cleaning the isolation unit daily, including the floor, using an effective disinfectant.
2. Disinfection of all articles, including the soiled linen, contaminated articles, etc. before they are sent out of the unit.
3. Disposal of all wastes by incineration.
4. Safe disposal of excreta.

The stool and urine in enteric isolation should be mixed with equal quantity of freshly prepared lime (1part of lime to 4 parts of water) and allowed to stand for 2 to 4 hours. Then it is dispensed by burial. The stools can be burned after mixing it with saw dust. In hospital practice, however, the septic tanks are in use and they are the best means of the disposal of excreta. No stool with any disinfectant should be discarded in a septic tank because the disinfectant will hinder the natural biological action. The sputum can be collected in a sputum cup with a lid. The containers need to contain either water or disinfectant lotion so that the sputum will not stick to the sides. When the container is full, it needs to be boiled or burned.

Terminal Disinfection

The terminal disinfection is the disinfection of the client's unit with all the articles used on discharge, transfer or death of a client who had been suffering from an infectious disease.

Fumigation is often used for this purpose. The commonly used agents are sulphur and formalin. The doors and windows, including all crevices, are closed prior to fumigation.

Fumigation with Sulphur

The room should be filled with steam by boiling a kettle of water in the room as the sulphur fumes act better on a damp surface. A small room of 100 placed in an earthenware which stands in a large oven containing water. A little methylated spirit is poured over the sulphur to ensure burning the sulphur completely. Lit fire to the sulphur

and close the door. The room is opened after 24 hours.

The effectiveness of this method depends upon several factors, such as gas concentration, temperature of the room, exposure time and humidity. All articles should be kept open for thorough penetration by the sulphur fumes.

Management of the Isolation Unit

A unit that is set up for the isolation of clients needs to have the following equipment:

1. Hand washing facilities – skin, water tap, soap, brush, etc.
2. Paper napkins.
3. One table should be kept to place necessary supplies for the care of the client e.g. thermometer, dressing trays, etc.
4. Toilet facilities for the client – water closet, bathing facilities, etc.
5. Garbage receptacle with paper lining.
6. Personal articles for toilet, food serving, etc.
7. An area outside the client's room for keeping clean supplies e.g. Gloves, Gowns, Masks etc.
8. Vessels for disinfection of articles with disinfection solution.
9. Door cards stating "ISOLATION" on the door.

The GDA before entering the room, washes his/her hands, puts on clean gowns and mask and enters the room. He/she then closes the door and attends to the client. She makes use of all medical aseptic practices to prevent the spread of infection. After attending to the client's needs he/she leaves the room, closes the door, removes the gown and mask and discard them in the containers with the disinfectant lotion. He/she then washes his/her hands thoroughly.

Good Housekeeping

The housekeeping department has the function of keeping the hospital clean. A well – managed housekeeping department can reduce the cost of hospital operation considerably. For the smooth functioning of the housekeeping department, the cooperation of all the hospital staff is necessary. If the hospital housekeeping is of poor quality, nursing care suffers, efficiency is lowered and the morale of the staff and patient is lowered.

In many hospitals, the housekeeping responsibility is vested with the head nurse, while in others it is delegated to the housekeeping department, which is managed by a Housekeeper. Sometimes this responsibility is shared by both. The person who is responsible for the hospital housekeeping must have an interest in housekeeping and

give a considerable place in the nursing service. He/she must possess high standards of workmanship and good organizing ability. To be successful, she must have an interest in the people, an appreciation of the fundamental worth of mental task and an ability to direct and supervise people.

Cleanliness and Orderliness

Clean equipment, clean linen, clean floors and walls are relatively free from pathogenic organisms. Principles of good housekeeping and the best methods of caring for the equipment and physical environment of the client including the floors, furnishings, painted surfaces and sinks should be implemented thoroughly.

Cleanliness and orderliness go hand in hand. Where there is order there is peace and harmony. One can imagine the disorder created in the hospital ward by the equipment scattered here and there, the rubbish thrown on the floor, the soiled linen piled up in the corridors or in the corners of the ward. On the other hand, if the beds neatly made, furniture in line, equipment clean and in order and conveniently placed it will create an attractive surrounding and clean environment. An attractive surrounding creates confidence in the clients and visitors and increase the morale among the workers.

Purpose of Cleaning

- To leave a clean polished surface wherever possible, so that dirt may not be accumulated.
- To remove all dust, dirt and breeding places of microorganisms with least disturbance to the client.
- To prolong the life of articles.
- To keep the articles in such a condition that they are ready for use at any time.
- To maintain the aesthetic factors.

Exercise

- 1 . Visit a nearby hospital and observe the materials used for cleaning of wards. Enlist the materials based on your observation and write the method of use.
2. Visit a nearby hospital and observe the personnel involved in housekeeping. Write about the duties performed by them.

Personnel	Duties

Assessment

A. Short Answer Questions:

- 1. What is the procedure of disinfection of stool and urine?

- 2. What is the difference between concurrent and terminal disinfection?

- 3. Explain the process of fumigation with sulphur

- 4. Why patient's unit should be kept clean and disinfected?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Concurrent and terminal disinfection.
- 2. Cleanliness and orderliness.

Part B

Discussed in class the following:

- 1. Importance of cleanliness in the hospital.
- 2. Good housekeeping practices
- 3. Management of Isolation Unit

4. Types of disinfectants

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Demonstrate the knowledge of the process of disinfection		
Demonstrate the knowledge of good housekeeping practices		

Session 2: Care of Articles

In this session, you will learn about care of various rubber based articles, ward articles and instruments used in a hospital. You will also study the procedures of removing different kind of stains.

Relevant Knowledge

Care of Rubber Goods

The rubber goods in common use are air cushions, mackintoshes, hot water bottles, ice caps, ice collars, rubber tubes catheters, rectal tubes, gloves and rubber beds. The GDA should make all efforts to prolong the life of the rubber goods. Natural and synthetic rubbers deteriorate with age, exposure to heat, light, moisture and by chemicals. They should not be creased or folded, never use any pins to fix rubber goods in any place. Never expose them to sunlight. Boiling water ruins rubber. Rubber goods should never be dried by artificial heat, nor by contact with a radiator or stove. They should be free from grease and acids. These should not come in contact with metal goods. Any fluid split on them should be wiped off immediately. When storing, care must be taken so that no two surfaces come in contact with each other. They should not be pressed out of shape by any weight. They should not be tied in knots. They should not be hung on hooks or nails. If boiling process is used, put them in boiling water. If autoclaving is used, short period of exposure is recommended (10 to 15 min) with less pressure.

Cleaning of Rubber Mackintosh

1. Spread the mackintosh on a table or a flat surface and wet it with cold water.
2. Rub the upper surface with soap and water using a clean cloth or towel.
3. Turn the other side and repeat the process as above.
4. Wash both surfaces under running water.
5. If stains are present, care should be taken to remove them by appropriate methods.
6. For disinfection, use Lysol or Dettol 1 : 40.
7. Hang them on a horizontal cylindrical pole in shade to dry. Spread them without wrinkles.
8. When both surfaces are absolutely dry, powder them lightly with French chalk powder.
9. Store them either flat or rolled and never folded, taking care to see that two mackintosh surfaces do not lie together, but are separated by old linen or paper

Store them in a dark cool place in airtight containers, whenever possible.

Care of Rubber Gloves

1. The wearer of the gloves should wash them on their hands just before they are removed to prevent adherence of blood and other organic materials.
2. After removing from the hands, they are washed with soap and cold water, first on the outside, then invert and repeat on the inside.
3. Rinse well with water both inside and outside as described above.
4. Holes and tears are discovered by submerging the glove filled with air in the water. If there are holes the bubbles will pass up through the water.
5. Hang them to dry. When the outside is dried, turn inside out and dry.
6. When both sides are dried. They are powdered inside and outside and packed in pairs of the same size, right and left gloves in glove wrapper. A small lump of gloves powder in a gauze mesh for powdering the hands is kept in the cuff of the gloves.
7. Steam under pressure is the best method of sterilizing gloves. The pressure is kept minimum to prevent melting of the gloves.

Care of the Rubber tubes

Catheters vary in size and quality according to the special need. Sizes of the catheters are marked on it either in French or English scales.

1. After use wash rubber tubes under running water, holding the eye end upwards and allowing the water to run through
2. A small quantity of organic matter may be lodged at the eye end. Remove them using a swab stick.
3. Clean them with soap and warm water to remove the dirt and grease.
4. Wash them again under running water.
5. Boil the tubes for 5 min by putting them in the boiling water. Dry them by hanging.
6. When dried, powder and store them in airtight containers.
7. Reboil or autoclave them before use.

Rubber tubing used for the parenteral therapy requires special attention. It must be

washed by forcing detergent solution through it first then by water and finally by distilled water. Infusion solution flowing through new rubber tubing, have been found to contain products from the rubber that are toxic to the client. To correct the toxic factor, the tubing's are boiled in 10% soda bicarb solution for 30 min. It is essential that the soda bicarb should be thoroughly removed from the tubing before it is used for the client. Rubber tubing used for the blood transfusion should be rinsed immediately after use. It is recommended that the tubing which contained blood 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. ureteric catheters which are easily destroyed by heat and moisture are disinfected using formalin tablets.

Hard rubber tips used in cleaning and medicating the body cavities (e.g. douche nozzle) also need special care. They are moulded 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 the Air cushion, Rubber Beds, Hot water bottles, Ice caps and Ice collars

To clean the air cushion and airbeds, do not pour water into them. It is sufficient to clean the outside. During cleaning it should not be filled with air, because while rubbing there is a tendency to exert pressure on the seams at the sides of the articles and they may crack. The valves of the air cushions or beds should never be immersed in water as it spoils them, and is one of the reasons why they get out of order. Cleaning and storing are done like other rubber goods except that they should be slightly inflated to prevent the two surfaces to come in contact with each other.

In case of hot water bottles, ice caps and ice collars, empty the contents immediately after use. Wash and dry as in the case of other rubber goods. Hang the bags upside down to drain the water. The ice bags, which cannot be hung, are dried with a piece of cloth. When the bags are completely dried inflate them with air.

The covers of the air cushion, ice bags and ice collars are disinfected and sent to the laundry for washing.

Care of Enamelware

The articles commonly used are bedpans, urinals, kidney trays, sputum cups, feeding cups and trays. The polishing on the enamelware gets eroded by heat, mercuric salt, acids, alkalis and by chemicals. They are subject to chipping if dropped on the floor or handled carelessly. Scraping with sharp instruments also result in chipping.

Care of Bedpans

1. Before emptying the bedpan, inspect the contents. If there are cotton sponges or

sanitary pads thrown into bedpans, they are removed by using forceps kept for that purpose only.

2. Empty the bedpan into a lavatory pan. Care should be taken to avoid soiling the sides of the basin.
3. Rinse the bedpan with cold water under force. Wash with soap and warm water using a brush. Vim may also be used to remove the stains. Rinse it well.
4. To disinfect the bedpans, soak them in Lysol 1:40 for 1 hour or they are sterilized in bedpan sterilizers. Bedpans may be placed in direct sunlight for few hours to deodorize and to disinfect. Keep them dry for the next use on the bedpan rack.

Care of Urinals

The urinal should not be left standing for a long time with urine because a deposit will form on the inside, which is almost impossible to remove. Cleaning and disinfection are done in the same way as for the bedpans.

Care of Kidney Trays

Kidney trays are treated in the same way as the bedpans.

Care of Sputum Cups

Non-infectious sputum may be emptied into the lavatory pan. Care should be taken not to soil the sides of the pan. Infectious sputum (e.g. the sputum of a tuberculosis client) should be rendered harmless by boiling or disinfection by chemicals or it may be disposed by burning. Cleaning and disinfection of the sputum cup is done as for the bedpans. Before the sputum cups are given to the client, add a small quantity of antiseptic lotion, main purpose of which is to prevent the sputum sticking to the sides.

Care of Sharp Instruments

The knives and scissors are the most commonly used sharp instruments. The sharp instruments are sterilized by hot air sterilizer, exposing them to a temperature of 160°C. Disinfection can be done by submerging them fully under pure Dettol or other disinfectants which are not corrosive. The effect of any chemical disinfectant should be carefully investigated before it is used.

Care of Other Instruments

A wide variety of instruments are used in the operation theatre which may be dangerously contaminated. The soiled instruments may be unhinged (opened) with gloved hands and dropped into a basin or bucket. Rinse the instruments thoroughly with cold water to remove the blood and other organic matter. Clean the instruments with sodium carbonate (to make 2% solution) and hot water. All instruments should be examined for cleanliness and orderliness before they are sent to sterilization.

Those instruments which are not clean should be treated separately. Abrasives and soaps tend to remove the protective film of corrosion resistant metal put on by the manufacturer and their removal shortens the life of the instruments.

Steam under pressure should be used to sterilize instruments whenever possible. When the steam under pressure is not available, boiling water is the best agency for sterilizing instruments. The longer the boiling period, the greater is the probability of all organisms to be killed. Remember the rules for boiling.

Care of Glassware

When buying glassware, it is important to select a hard glass that is resistant to heat and mechanical shock. To facilitate cleaning, the glassware should have a hard smooth surface. Ground glass is very susceptible to erosion by water or steam. Therefore, it should be sterilized with dry heat. Abrasives of all sorts are to be avoided in cleaning glass as they cause streaking. Immediate rinsing under cold running water to remove organic matter from the glass articles is essential in prolonging their usefulness, lest they dry on the glass and can be removed with difficulty. Rinsing with force is preferred in cleaning glass. 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 Syringes and Needles

Syringes make an expensive and common item of the glassware used in the hospital. Rinsing immediately after use is important to prevent the pistons sticking to the barrels, thus prolonging the life of syringes. Stuck syringes may be placed in 25% aqueous solution of glycerine and boiled for 10 minutes or soaked in weak solution of nitric acid to separate the parts. If the needle is stuck to the hub of the syringes, immersing it in the boiling water will make the metal expand and separate them.

Some syringes are interchangeable. Others will have same number on the barrel and the piston, in order that they can be easily matched. When cleaning and sterilizing syringes, the barrels and pistons of the same number should be kept together to avoid wasting time later in matching the parts.

Sterilization by hot air is the best method of sterilization for glass syringes, if the glass has the same expansion coefficient. The syringe may be placed in the hot air sterilizer with the piston in place. Steam or chemical sterilization is with the piston in place. Steam or chemical sterilization is more effective, if the parts are separated, because the contact with the sterilizing agent is more complete. If the syringes are boiled in distilled water, silicate is taken from the glass and it results in a slow deterioration of

the syringes. Never put glass in boiling water. Put the glassware in cold water and bring to the boiling point.

In sterilizing asepto syringes, remove the rubber bulb from the glass barrel. This facilitates the penetration of the sterilizing agent and keeps the rubber from sticking to the glass, as it is very likely to do so when it is very hot. The bulb and the glass portion should be wrapped in the same package to avoid the loss of one part. No instrument requires more meticulous attention than the needles. The bore is so fine that it becomes blocked badly unless cleaned each time it is used. The points of the needles are so delicate that the slightest contact with a hard surface may bend them backwards and produce a “hook”. The important points to remember are as follows:

1. After use, cold water is forced through the needle with a syringe followed by a detergent solution.
2. Again wash it with warm water.
3. Examine the point a magnifying glass or by drawing the point over the skin to discover the “hooks”. If hooks are present is corrected in a sharpening device. Take care to preserve the bevel.
4. If the needles are blocked, wire stillets are used to remove them.
5. Needles are sterilized by boiling them for 10 to 20 min or by dry heat at a high temperature or by autoclaving.
6. Chemical disinfection is unsatisfactory, because it is difficult to remove the chemical from the bore of the needle completely. Suture needles are treated in the manner described for other sharp instruments.

Care of Stainless Steel Goods

Stainless steel utensils are suitable for almost every other purpose, because they are easily cleaned, heat resistant and unbreakable. When storing these utensils is to be kept dry lest the water on them leaves a mark.

Care of Crockery's and Cutleries

The Crockery's and cutleries, used for the clients need special attention. They should be rinsed in cold water and then washed with soap and warm water. Disinfect them by boiling, store them after drying.

Care of Linen

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

1. The linen cupboard should be kept in perfect order, with different items stocked separately and labelled to prevent confusion and loss of item.
2. The cupboard should be locked when not in use.
3. Care should be taken to avoid linen being taken home by the clients on their discharge
4. Stocks should be checked at regular intervals, the inventory properly kept and losses reported promptly.
5. All items should be used for the purpose for which they were made.
6. Torn linen should not be used on the bed but sent for mending.
7. Soiled linen should not be placed on the floor.
8. Damp linen should be dried. If they are not immediately washed, lest it becomes mildewed.
9. If soiled with urine or motion, these should be rinsed with cold water first to remove the stain.
10. If there are stains remove them by using an appropriate stain remover.
11. The linen used for an infectious client, should be disinfected first before they are sent to the laundry.
12. Use of mackintosh, wherever it is necessary can economize the use of linen.

General Instructions for Removal of Stains from Linen

1. Note the kind and the colour of the material stained. The nature of the stain and select the correct stain removed and follow an appropriate method.
2. Try the simplest method first.
3. Remove stains as soon as possible
4. Try first whether stains can be removed with cold water.
5. For coloured material, always test the remover first on a small part.
6. The stains which contain protein, such as blood, excreta, milk, pus from the wound, etc, are coagulated by the application of heat. So for all stains of this nature, the

- articles should be soaked in cold water for sometime to remove the stains.
7. If the stains contain fatty material, hot water and soap should be used.
 8. Any stains of medicine may be treated by water or methylated spirit, as many drugs are soluble in spirit and some other in plain water.
 9. The application of some absorptive material, such as salt, starch or borax will prevent any liquid from spreading and thus reduce the ultimate damage to the material.
 10. When the stains do not respond to the simple methods, bleaching agents may be used such as lemon juice, hydrogen peroxide and bleaching powder. When bleaching powder is used, make it into a solution and apply a weak solution first on the stained area and then gradually increase the strength of the solution. Bleaching agents are destructive to linen and discolor the coloured material.
 11. When using boiling water for removal, stretch the stained part over a bowl and pour the boiling water with force until the stain disappears.
 12. When using an acid, stretch the part over a bowl of boiling water and apply acid by means of a medicine dropper, applying the acid. When the stain disappears, rinse the cloth thoroughly in cold water.
 13. When bleaching by the sunlight wet the stained area and lay it in the sunlight.
 14. Use equal parts of hydrogen peroxide and dilute ammonia and moisten the stain until it disappears. This is particularly useful in case of woollen articles.
 15. Strong chemicals are used only as a last resort because of the injurious effect caused by them.

Cleaning Blood Stains

Soak immediately in cold water. Hot water coagulates and leaves a mark. When the stains disappear, wash them in warm soapy water. If it is an old blood stain, soak it in a mixture of hydrogen peroxide and ammonia for several hours and then wash it in cold water and then with soap and warm water.

For the thick blood stains on the mattress, apply a thick paste of starch and water, and allow standing in the sun. When the paste is dry and discoloured, brush off the stain.

Cleaning Tea and Coffee Stains

Linen, as soon as it is stained with tea, coffee and cocoa, remove it by pouring milk over it. Washing them in cold water or washing them in hot water and sodium carbonate will remove the stain. If not completely gone, lemon juice may be rubbed or hydrogen peroxide may be applied.

Cleaning Aniline Dyes, Gention Violet, Methylene Blue Stains

Wet the cloth and bleach them in the sunlight. Chlorine water bleaches the dyes. If chlorine water is used, rinse the bleach thoroughly with warm water after the stain disappears.

Exercise

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	

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	
Enamel Ware	
Bed pans	
Kidney trays	
Sputum Cups	
Glassware	
Syringes and Needles	
Stainless Steel Goods	
Blood Stains	
Candle Wax Stains	

Assessment

A. Short Answer Questions:

1. How do you remove the blood stains from linen?

2. What are the precautions to be taken while disinfecting sharp instrument?

3. Explain the procedure of removing different kinds of stains

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Disinfection of rubber mackintosh and rubber gloves.
- 2. Cleaning of rubber tube and hard rubber tip catheter.
- 3. Disinfection of bed pan and urinals.
- 4. Blood stain and candle wax stain

Part B

Discussed in class the following:

- 1. Role of GDA in care of different articles used in hospital

2. Removal of various types of stains

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Demonstrate the knowledge of care of various rubber based articles, ward articles and instruments used in a hospital		
Demonstrate the knowledge of removing different kind of stains		

Session 3: Disinfection of Wards

In this session you will learn about disinfection procedures, cleaning levels, cleaning frequencies and cleaning agents. You will also study about chemical disinfectants used for various cleaning techniques in the hospital.

Relevant Knowledge

The World Health Organization (WHO) estimates that at any time, more than 1.4 million people worldwide are affected by infections acquired in hospitals. Between 5% and 10% of patients admitted to modern hospitals in the developed world acquire one or more healthcare-associated infections. Cleaning, disinfection and sterilization saves lives and improves patient outcomes.

Healthcare-associated infections are also an important problem in extended care facilities, including nursing homes and rehabilitation units. Transmission of healthcare-associated pathogens most frequently occurs via the hands of healthcare workers, who inadvertently contaminate their hands during various patient care activities. Less frequently, contaminated surfaces in healthcare facilities may contribute to the spread of healthcare-associated pathogens. Contaminated surfaces can act as sources from which healthcare workers contaminate their hands, and in some instances, patients acquire pathogens following direct contact with contaminated equipment or other surfaces. Providing patients with a safe environment of care requires a high level of compliance with recommended hand hygiene policies and appropriate cleaning and disinfection of medical equipment and environmental surfaces.

Patients colonized or infected with healthcare-associated pathogens frequently contaminate items in their immediate vicinity with pathogens that may remain viable on surfaces for days to weeks. Healthcare workers can contaminate their hands by touching contaminated surfaces, and can transmit pathogens if hands are not cleansed appropriately. Routine cleaning of patient rooms is often suboptimal. Improved cleaning/disinfection of the environment can reduce the risk of patients acquiring multidrug-resistant pathogens. Monitoring the effectiveness of hospital housekeeping procedures is needed to assure that surface contamination is reduced to a minimum.

Patients, staff, and visitors entering healthcare facilities carry with them bacteria, viruses, and other microbes. Because of this, cleaning and disinfecting are some of the most important steps in preventing the acquisition and spread of infectious disease in healthcare facilities.

General cleaning involves dirt and dust removal using detergents, scouring powders, toilet bowl, and glass cleaners. This aspect of hospital cleaning is similar to that of an office building or hotel.

In some areas of the hospital, the use of disinfectants is necessary to reduce the risk of infection. Disinfection is generally defined as reducing the number of microbes on a surface to very low levels. Reducing microbial levels involves the use of chemicals, which are considered pesticides and vary in degree of toxicity.

Disinfectants, are designed to be toxic, contain chemicals that are corrosive, irritants, and potentially carcinogenic. They are used to kill microbes and achieve an appropriate level of cleanliness. Implementing best management practices will encourage the use of justified amount of disinfectant necessary to do the job, thereby reducing worker and environmental exposure. Ultimately, incorporating best management practices for use of disinfectants protects patients, employees, and the environment.

Right Level of Clean

Different levels of cleanliness are needed for different activities. They are as follows:

1. **Surface Cleaning:** General surface cleaning physically removes all visible dirt, organic matter, and bacteria. It is normally accomplished with water, mechanical action like scrubbing, and detergents. Surface cleaning should always be followed by disinfecting and sterilizing. If organic matter is not first removed it can inactivate disinfectants.
2. **Disinfectant Wipes:** Often disinfectant wipes dry before adequate contact time is achieved. They are also often used in applications where they are not needed, adding expense and pollution. A re-sable wet cloth with the appropriate disinfectant applied for the recommended contact time is less expensive and more efficacious option.
3. **Disinfecting:** Disinfection reduces the risk of infection from microbial contamination. It is done to reduce the chance of infecting patients and others. Disinfecting is necessary for surfaces or equipment that may contact broken skin or mucous membranes. High-level disinfection is required for semi-invasive medical procedures like endoscopy. Lower levels of disinfection are used on high touch surfaces in surgery wards and kennels.
4. **Sterilizing:** Sterilization eliminates or destroys bacteria and viruses. Sterilization is accomplished with hot steam and pressure, toxic gases such as ethylene oxide, or hydrogen peroxide.

Cleaning Frequencies

Ideally, cleaning all areas should be done as soon as dirt becomes obvious. Therefore, hospital policy for cleaning should be laid down very clearly in the hospital manuals. Areas, such as OT and ICUs should be cleaned more often. The washing of walls and ceilings should be infrequent, not more often than once a month or two. However, where walls were splashed with blood or other organic material, the soiled patches should be washed as soon as possible.

Cleaning Agents

A cleaning agent should assist the removal of dirt from a surface without harming the user or damage the surface. The following cleaning agents are suggested for use in the hospital:

- An anionic liquid detergent is found to be most suitable for floors, ceilings, walls, work surfaces and baths;
- Scouring powder for cleaning sinks, baths, showers and lavatories;
- The presence of disinfectant does not increase the cleaning power of the product; and
- Chemical disinfectants are useful only on clean surfaces, therefore, the floor should be first cleaned with detergent and then disinfected.

Chemical Disinfectants

They are recommend for disinfection of baths after cleaning, disinfection of kitchen work surface after cleaning, disinfection of floors and work surfaces in OTs, special care units, high-risk areas during or after cleaning on some occasions and disinfection of floors after spillages.

Cleaning Techniques

1. Floors: In a busy ward, recontamination from airborne settlement or transfer from shoes and trolley wheels is very rapid. Levels of bacterial contamination on floors are usually restored to their original level within two hours of cleaning; whether disinfectants are used or not. isinfectants should only be used on a clean surface. However, mops should be disinfected after use in the rooms of infected patients and also before use in rooms occupied by immunosuppressed patients. A neglected dry mop will redistribute microbes, which have been picked up. A neglected wet mop will grow pseudomonas on it, which will get distributed while cleaning.
2. Carpet Care: Usually bacteria have been found to be present in large numbers on the carpets and survive longer than on hard floors. Carpets should be first tested with the commonly used disinfectants to see their damaging capacity. Chlorine releasing agents could be used to clean blood spillage, but it damages most carpets. Therefore, peroxygen powder could be used as a substitute. In offices and administrative areas carpets could be maintained with a daily vaccuming and shampooing once a week.
3. Walls and Ceilings: It should be carried out sufficiently often to prevent the accumulation of visible dirt, but intervals between cleaning should not exceed 12-24 months in patient care areas or 6 months in operating theaters.
4. Bathroom and Lavatory Cleaning: Sufficient amount of disinfectant solution should be sprayed on to the bathroom fixtures and surfaces and be allowed to remain for

a period of maximum disinfection. The cleaning and flushing of toilet is enough to keep the microbes" level to the minimum. Brushes should be rinsed with water and shaken into the pan and stored dry. Baths could be a source of cross infection, therefore use of scouring powder or a liquid detergent (preferably anionic with hypochlorite solution) for thorough cleaning after use. Daily use of bowl cleaners is not needed as they are acid and need to be handled carefully by an expert. It was more cost effective and safer to use a disinfectant detergent to clean toilet on a daily basis, saving the bowel cleaners for use on mineral deposits only.

- 5. Ancillary areas: This includes offices, solaria and waiting room. In a general sense, the same rule of cleaning is applied here also but in a much rigorous way with a lesser frequency. The objective is to provide a clean and safe environment.
- 6. Corridors and Stairwells: Two important things to be obeyed while working on stairwells and corridors were- first to use wet floor signs if the floor is wet and second, to mop only one-half of a corridor or stairwell at a time to avoid accidents.
- 7. Kitchen Work Surface: All disinfectants get inactivated to some extent by food, particularly proteins. A two-step process of cleaning with a detergent and then with disinfectant obtains the best results.

Exercise

- 1. Visit a nearby hospital and observe the cleaning method of any three departments. Write the name of chemicals and cleaning method used in the table given below:

S.No.	Name of Department	Cleaning Method	Chemicals used
01			
02			
03			
04			

- 2. Visit a nearby hospital and find different level of cleaning in different areas of hospital and fill the table given below:

S.No.	Level of cleaning	Area/ Wards in hospital
01	Surface cleaning	
02	Disinfectant wipes	
03	Disinfection	
04	Sterilization	

Assessment

I. Short Answer Questions

- 1. What are the major causes of infection in hospital?

- 2. What is the role of hand hygiene in prevention of infection?

- 3. List the various level of cleaning?

- 4. List the cleaning agents used in a hospital

B. Fill in the blanks

- 1. Anionic liquid detergent is most suitable for _____ and baths.
- 2. Sterilizing virtually eliminates or destroys bacteria and _____
- 3. Semi-invasive medical procedures required _____ level of disinfection.

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part A

Differentiated between the following:

- 1. Surface cleaning and disinfectant wipes.
- 2. Disinfection and sterilization.

3. Techniques used in cleaning of floor and carpet.

Part B

Discussed in class the following:

- 1. Levels of cleaning
- 2. Why disinfectant wipes are required on floor of the hospital?

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Identify the various level of cleaning techniques used in hospital		
Identify the different chemicals used in cleaning the floor of hospital		
Demonstrate the knowledge of role of GDA in managing disinfection of wards		

Session 4: Surgical Asepsis

In this session, you will learn about different methods of transmission of infection and asepsis practices. You will also study the method of opening a sterile wrapped package and use of gloves, gown and face masks.

Relevant Knowledge

Cross Infection

Cross infection is the infection transmitted between individuals infected with different pathogenic organisms. Cross infection occurs usually in the hospitals. It is the infection of a client with a disease other than that, for which he had been admitted. In other words, a client gets the infection from someone else during his stay in the hospital.

Method of Transmission of Infection

The following are the methods of transmission of cross infection:

1. Direct contact: The organisms can be transmitted directly from person to person through kissing, sexual contact, droplet infection and infected hands.
2. Indirect contact: Contact with the secretions and excretions of the infected persons.
 - Through fomites, e.g. instruments, utensils, etc.
 - Through contaminated food and water
 - Through insects
 - Through dust
 - Through carriers

Medical Asepsis

Medical asepsis refers to all practices used to protect the clients and his environment from the transmission of disease producing organisms (prevention of cross infection).

Surgical Asepsis

Surgical asepsis refers to all the procedures used to keep objects or areas sterile or completely free from all microorganisms. In medical asepsis, all practices are directed to the prevention of pathogenic organisms entering into the body, but in surgical asepsis all practices are directed to the elimination of both pathogenic and non-pathogenic micro-organisms. In medical asepsis, a “clean technique” is used, but in surgical asepsis a “sterile technique” is used.

Hand Washing

In surgical asepsis, the hands should be thoroughly cleaned for about 3 to 5 min. Hands are scrubbed up to 10 min. When washing hands, they are held above the level of the elbows (in surgical asepsis, the elbows are considered more contaminated than the hands), so the water should run from least contaminated area (hands) to the area of greatest contamination (elbows). It is important to put soap well and scrub with a brush and rinse thoroughly with water several times. A sterile towel is used to wipe the hands and arms, starting from the palms to the elbows. Prior to surgical scrubs, it will be necessary to put on the head caps and masks.

Opening a Sterile Wrapped Package

01. Wash hands thoroughly.
02. Choose a large, clean working area above waist level.
03. Place the package in such a way that it can be opened away from the body.
04. The flap farthest away is opened first, with care not to reach over the sterile field. Then the side flaps are opened, and the flap nearest to the GDA is opened last.

When opening the flaps, care must be taken not to touch the inside of the wrapper. When opening the last flap, it is important to stand well back from the package in order to avoid contamination from the GDA uniform. If an inner wrapper is present, it is opened in the same way, but using a sterile forceps.

When trays need to be rewrapped (e.g. after solutions have been added to a dressing tray before it is taken to the bedside) it should be wrapped in the reverse order to that of unwrapping. The proximal flap is closed first to prevent reaching across the sterile field, the side flaps next, and the distal flap last.

Use of Gloves

To put on the first glove, GDA grasps the glove by its cuff, being careful to touch only the inside of the glove. The sterility of the outside of the glove must be maintained. Remember that the GDA hands are considered to be contaminated. To put on the second glove, the sterile gloved hand must be used. The second glove is picked up by inserting the gloved finger under its cuff. The second glove is then pulled. The cuff of both gloves may then be unfolded by touching only the sterile sides.

Gowning

Sterile gown are worn in the operating room and the delivery room and whenever open wounds are present which necessitate a sterile technique e.g. to attend to a client with burns. To keep the gowns sterile, they are folded inside out and are touched only on the inside.

The points to remember when putting on a gown:

1. Put on the head cap and mask first.
2. Scrub hands thoroughly.
3. Dry the hands with sterile towel.
4. Pick up the gown by grasping the folded gown at the neck, stand well back about a foot from the sterile bundle and the table.
5. Unfold it by keeping the gown away from the body. Do not shake the gown.
6. Hold the gown at the shoulder seams (inside) and put each hand alternately in to the arm holes.
7. Extend the arms and hold hands upward at the shoulder height when putting them through the arm hole.
8. The circulating staffs then assist his / her in pulling the sleeves by working from behind and holding the gown from the inside.
9. The gown is then fastened at the neck by the circulating nurse and the open edges are then folded or held together.
10. The waist ties are then fastened by the circulating staff behind.

Face Masks

Masks are generally used to prevent the spread of microorganisms through the respiratory tract. Masks should be worn only once and then discarded to ensure effective filtering of micro – organisms. Masks that become wet are less effective and should be discarded. A masks should not be worn more than 1 to 2 hours at a time. The mask is not worn outside the unit. Masks need to cover both mouth and nose, and fit snugly around the face to prevent the escape of microorganisms around the sides. There should be minimum layers of cloth for the effective filtration of air. The points to be remembered while wearing the mask:

- Wash hands.
- Remove the clean mask from the container with sterile forceps (the mask should be sterilized and kept for the use)
- Hold the mask by its teeing. Fit it to the face and tie the strings at the back of the head. Do not touch the mask that covers the face. It is important that both mouth and nose must be covered.

To remove the mask:

- Wash hands.
- Remove the gown (if worn).
- Remove the mask and discard it in the container for “used masks”.
- Wash hands thoroughly.

Exercise 1. Visit a nearby hospital and observe the various units. Differentiate the units where the medical and surgical asepsis is used. Write the name of units in the table given below:

Medical Sepsis

Surgical	Asepsis
1	1
2	2
3	3
4	4
5	5

2. Practice the method of wearing gown, face mask and hand gloves

Assessment

I. Short Answer Questions

1. What is asepsis?

2. What is the importance of handwashing?

3. How will you open sterile wrapped tray?

4. Explain methods of transmission of infection

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity.

Part A

Differentiated between the following:

- 1. Direct and indirect contacts.
- 2. Medical and surgical asepsis.

Part B

Discussed in class the following:

- 1. Importance of prevention of cross infection
- 2. Importance of hand washing
- 3. Methods of transmission of infection
- 4. Types of asepsis

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Identify different methods of transmission of infection and asepsis practices		
Demonstrate the steps of wearing gown, face mask and hand gloves		
Demonstrate the steps of hand washing		

Session 5: Disinfection of Operation Theater

In this session, you will learn about operation theatre discipline, surveillance, cleaning and air borne pathogens surveillance. You will also study the training methodology of paramedical staff/GDA. Fumigation procedures, guidelines to be adhered for surgical theatre sterility and duties of GDA in operation theatre will also be covered in this session.

Relevant Knowledge



Surgical site infections (SSIs) are the second most common cause of hospital acquired infections. These complications of surgical procedures cause considerable morbidity and when these occur deep at the site of the procedure, it can lead to mortality as high as 77%. The source of SSIs may be endogenous (normal flora of the patient's skin, mucous membranes, or viscera) or exogenous, which includes surgical personnel (especially members of the surgical team), the surgical room environment (including air, floor and wall), and tools, instrument and materials brought to the sterile field during surgery. By maintaining sterile environment in surgical theater, a major part of exogenous infections can be controlled. The following precautions help in reducing the rate of infection:

- Establish an infection control committee to monitor the events in the hospital on all matters related to the control of infections.
- The entry of unnecessary personnel should be restricted into operation theatre as everyone potentially contributes to infection.
- A thorough washing with warm water and good detergent can bring more of an overall improvement than sterilization with other chemical or fumigation.
- Frequent monitoring and training of medical and paramedical staff must carry a high priority than merely observing mechanical and chemical methods.
- Thorough washing and carbolisation, if done every day after the surgeries, will greatly enhance the safety standards and reduce the repeated expenditure on fumigation.

Operating Theatre Discipline

- Only people absolutely needed for an assigned task should be present in the operating theatres.
- People present in theatre should make minimal movements and curtail unnecessary movements in and out of theatres. This will greatly reduce bacterial count.
- Airborne contamination is usually affected by the type of surgery and the quality of

air, which in fact depends on the rate of air exchange.

- All the persons are partners in infection control and should be careful to comply with infection control regulations.
- Prompt disposal of theatre waste is a top priority. Any spillage of body fluids, including blood on the floors, is highly hazardous and prompts the rapid multiplication of nosocomial pathogens.

Surveillance of Operation Theatre

- The environment in the operating theatre is dynamic and subject to continuous change. Good infrastructure do not mean a safe environment, as people make a greater impact by making the environment safe.
- The role of microbiological surveillance is crucial, and health workers or GDAs should be aware of organisms, sites and populations.
- GDA should be familiar with the clinical techniques, as those normally used for culturing clinical specimens may not yield correct results when applied to environmental specimens.

Bacterial counts in operation theatres are influenced by the number of individuals present, ventilation and air flow. The results should be interpreted taking this into consideration.

Surveillance of Air Borne Pathogens

- In resource poor hospitals, settle plates with blood agar are used and can detect pathogens. Multiple plates are kept and results are based on overall assessment rather than on a single plate study in the room. Microbiologists will clarify the acceptable counts at the different physical locations in multispecialty hospitals.
- Slit sampler and air centrifuge equipment for bacterial counts are replacing settle plates. The safe level of colony counts can be calculated as per the standards created with peer reviewed studies by the manufacturers.
- Doing too frequent surveys is expensive and will not correlate the existing infection rate in the hospital, but can indicate the circumstance we operate.
- The age old tradition of detection of anaerobic spores of *Clostridium tetani*, and gas gangrene producing organisms are losing ground with the onset of more awareness on theatre sterilisation. Routine testing for the anaerobes are not essential except when there are suspected cases of Tetanus or gas gangrene attributed to operating in a particular theatre.
- Ideally the operating theatre should be survey for anaerobes when newly constructed, or when any remodelling.

Cleaning the Operation Theatre

1. At the beginning of the day: Only remove the dust with a cloth wetted with clean water. Wipe theatre furniture lamps, sitting tables, trolley tops, operation tables, procedure tables, and Boyle's apparatus. Use chemicals/disinfectants unless contaminated with blood or body fluids.
2. Between the procedures: Clean operating tables or contaminated surfaces with disinfectant solutions. In case of spillage of blood/body fluids, decontaminate with bleaching solution/chlorine solution (10% available chlorine). Discard all waste in plastic bags. Do not discard soiled linen and gowns on the operating theatre floor.
3. At the end of the day: Clean all the table tops, sinks and door handles with detergent, followed by low level disinfectant. Clean the floors with detergents mixed with warm water. Finally, mop with disinfectant like phenol in the concentration of one in ten. Keep the operating theatre dry for the next day's work.

Training Paramedical Staff

The short solution to controlling infection lies with trained staff. The principle and control of infection should be taught to all newcomers. Simple, repeated hand washing is the most cost effective method of reducing several infections in hospitals – in particular in operating theatres.

Fumigation Procedure

Formaldehyde fumigation has long been an accepted method of sterilization for areas where microbiological cleanliness is required. Fumigation with formaldehyde vapour is the recognized and most commonly used method.

Formaldehyde vapour is an extremely effective biocidal agent. It acts as an alkylating agent, inactivating micro-organisms by reacting with carboxyl, amino, hydroxyl and sulphhydryl groups of proteins, as well as amino groups of nucleic acid bases. Fumigation is effective at above the temperature of 20°C and relative humidity of 65%.

Formalin is commercially available as 40% solution of formaldehyde in water. When formalin is heated formaldehyde vapour is generated. All workers using formaldehyde must be aware of safe handling procedures. Under certain conditions formaldehyde can react with hydrochloric acid and chlorine containing disinfectants such as hypochlorites to form chloromethyl ether, a potent lung carcinogen. So hydrochloric acid and chlorine-containing disinfectants must be removed from the room before fumigation.

Step 1: Preparation

1. Thoroughly clean windows, doors, floor, walls, surgery table and all washable equipment with detergent and water.
2. Close windows and ventilators tightly. If there are any openings, seal it with cellophane tape or other material to avoid the leak of fume.

3. Switch off all lights, A/C and other electrical and electronic items.

Step 2: Precaution

1. Adequate care must be taken by wearing cap, mask, foot cover, spectacle, etc.
2. Formaldehyde is irritant to eye and nose and it has also been recognized as a potential carcinogen.
3. So personal protective equipment (PPE) should be worn before fumigation.
4. Paste a warning notice on the front door indicating fumigation is in progress.

Step 3: Fumigation

1. Electric Boiler Fumigation Method (Recommended): For Each 1000 cubic feet, 500 ml of formaldehyde (40% solution) added in 1000 ml of distilled water (if not available uses tap water) in an electric boiler. Switch on the boiler, leave the room and seal the door. After 45 minutes (variable depending to volume present in the boils apparatus/its heating proficiency) switch off the boiler without entering into the room.
2. Potassium Permanganate Method: Take 500 ml of formaldehyde (40% solution) in 1000 ml of distilled water (if not available use tap water) in a heat resistant bowel, preferably in a steel bucket and then add 450gm of KMnO_4 for 1000 cubic feet of theater volume. Repeat the same in separate bucket for every another 1000 cubic feet until it reaches the complete theater volume. It is important to add KMnO_4 to all buckets simultaneously to reduce the exposure to fume (i.e., need 3 or 4 persons at different location).
3. After the initiation of formaldehyde vapour, immediately leave the room and seal it for at least 12 to 24 hours.

Step 4: Neutralization

1. Before neutralization, formaldehyde fumigation system should be taken out from the surgical theater. Then the toxicity of formaldehyde vapour should be neutralized with ammonia solution.
2. Switch on the A/C, at least 2 hours before (09 a.m.) the "Sterility Test".
3. Place a cotton ball and pour 300 ml of 10% ammonia (for each 500 ml of formaldehyde used) on the floor of surgical theater, at least 4 hours before (07 a.m.) the "Sterility Test".

4. Formaldehyde gas reacts with ammonia gas and produce hexamine (synonym hexamethylenetetramine) which is considered a harmless substance.

Example:

Surgical Theater Volume = $L \times B \times H = 20 \times 15 \times 10 = 3000$ cubic feet

Note: Make it into nearest 1000, if the volume is in fractions Formaldehyde required for fumigation = 500 ml for 1000 cubic feet

= So, 1500 ml of formaldehyde is required (to be diluted in 3000 ml of distilled water ml of formaldehyde

Ammonia required for neutralization = 300 ml of 10% ammonia for 500

So 900 ml of 10% ammonia is required.

Guidelines to be adhered for Surgical Theater Sterility:

- A record (log book) should be kept and properly maintained for all fumigations with following details: date & time of fumigation, date & time of neutralization, personnel involved, and the dates of “sterility test”.
- Room allotted for surgery should not be used for any other purposes.
- Entire block should be thoroughly cleaned before fumigation. All apparatus such as suction, table, focus lights, A/C units, etc., should be cleaned according to manufacturer instructions.
- Surroundings should be clean and free from garbage, open drainage, bushes, shrubs, wastes, I.,
- Warning notice should be pasted on the front door indicating fumigation is in progress.
- Entry should be restricted to authorize persons.
- Separate footwear should be kept at the entrance (inside) of surgical theater.
- Theater dress (includes head cap, mask, apron and footwear, etc.,) should be made available for all persons who are entering into the surgical theater (surgeons, anesthetist, microbiologist, GDA, and helper).
- Surgical theater should be cleaned and fumigated periodically depending upon the case load.

Duties of GDA in Operation Theatre

- 1. The GDA is responsible for all the instruments and equipment required for the surgery.
- 2. He/she is responsible for sterilization of all the instruments and equipment required for the surgery.
- 3. He/she should scrub well from elbows to finger tips, taking care to clean under the nails and between fingers.
- 4. He/she should wear a mask and cover his/her head with a cap such that all his/her hair is properly covered.
- 5. He/she should wear a sterile gown as described under gown technique.
- 6. He/she should wear gloves as described under „glove technique“
- 7. He/she should handle only the sterile instruments and equipment required for the operation.
- 8. If he/she accidentally touch unsterile instruments or equipments, she should change her gown and gloves.
- 9. He / She should arrange the trolley by placing the following on the carbolized trolley.
 - (a). Sterile plastic sheet
 - (b). Sterile drapes: two one on top of the other
 - (c). Instruments in proper order.
- 10. He / She should count the number of instruments, swabs and mops to be taken at the time of surgery, so that she can count them again at the end of the surgery.
- 11. Drums of instruments and equipment not required should not be kept open unnecessarily.
- 12. He / She should not handle used mops and swabs.

Exercise

- 1. Visit a nearby hospital and observe the cleaning procedure of operation theaters. Fill the table given below as per the observation:

S.No.	Timing	Area of OT Cleaned
01	At the beginning of the day	
02	Between the procedures	
03	At the end of the day	

2. Visit a nearby hospital and find the type and amount of chemical used in fumigation of OT and fill the table given below:

S.No.	Type of chemical used in fumigation	Amount of chemical used in fumigation
01		
02		
03		
04		
05		

3. Make a list of the articles available in the operation theatre of the hospital

Assessment

I. Short Answer Questions

1. What are the precautions to be taken for reducing the rate of infection in OT?

2. Describe fumigation procedure in OT

3. What are the duties of GDA in OT?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Electric boiler and potassium permanganate method of fumigation.
- 2. Techniques of cleaning of OT during the operation and after the operation.

Part B

Discussed in class the following:

- 1. How equipment in OT are disinfected?
- 2. What is the use of ammonia in fumigation?
- 3. Duties of GDA in OT

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Identify steps used during fumigation		
Calculate the amount of formaldehyde/potassium permanganate used for fumigation		
Demonstrate the knowledge of cleaning procedure of Operation Theatre		

Session 6: Surgical Dressing

In this session, you will learn about objectives, characteristics, types and general rules of application of surgical dressing. You will also study different methods and steps of the dressing.

Relevant Knowledge

Dressing

A dressing is a protective covering applied to a wound to prevent infection, absorb discharge, control bleeding, and avoid further injury.

Objectives

1. To clean the wound
2. To prevent entries of microorganisms into the wound.
3. To give rest to the part so that the wound heals early and well.
4. To use local medications so that the wound heals early and well.
5. To remove slough from the wound.
6. To bring the edges of the wound together by pressure.

Characteristics of Efficient Dressing

1. It should be sterile.
2. It should be soft with proper pore to allow the oozing of discharge and sweating.
3. It should be large enough to cover the area of the wound and extend about 2-5 cm beyond it.

Types of Dressing

1. Adhesive Dressing

1. It is sterile.
2. Consist of pad of absorbent gauge of cellulose held in place by a layer of adhesive material.
3. It is available in different sizes and supplied in papers.

Method of application

1. Remove the outer wrapping and hold the dressing gauge side down.
2. Peel back and expose the gauge and place the pad onto the wound.
3. Press the ends and edges down.

2. Non Adhesive Dressing

1. Sterile ready made dressing.
2. It consists of layer of gauge covered by a pad of cotton wool with attached roller bandage to keep it in position.
3. The dressing is sealed in protective cover.
4. Available in different sizes.

Method of application

1. Remove outer and inner wrapping.
2. Unwind the bandage and open the dressing.
3. Place the dressing on the wound with gauge side down.
4. Bandage firmly until the pad is covered.
5. Secure the bandage by tying the ends over the pad or with the plaster.

3. Gauge Dressing

1. Gauge is commonly used in layers
2. It for large wound.
3. It helps in clothing
4. It is good absorbent, soft and pliable.

Method of application : same as non-adhesive dressing.

4. Improvised Dressing

1. It is used in first aid emergency when prepared dressing is not available.

- 2. Any clean, dry, absorbent material can be used, such as inside of clean hand kerchief, towel, linen, clean paper pads, or cellulose tissue.
- 3. Such improvised dressing is placed in position by any suitable material available.
- 4. Do not place cotton wool, lint or fibrous material directly over the wound, otherwise the fibers can become embedded into.
- 5. Antiseptic Medicated Dressing

Antiseptic medicated dressing contains medicine.

General Rules for Application of Dressing

- 1. Wash hands before dressing.
- 2. Clean the wound and its surrounding skin if wound is not large and bleeding is under control.
- 3. Avoid touching the contaminated wound and dressing.
- 4. Never cough or sneeze over the wound.
- 5. If necessary cover with non-adhesive dressing, with pads of cotton wool to help control bleeding and absorb discharge.
- 6. Always place the dressing directly onto a wound; never slide it on from the side.
- 7. Do not remove dressing. Add new dressing over the top of blood soaked dressing.

Contents of the Dressing Trolley

Part	Contents
Upper compartment	• Drum of sterilized towels • Drum of sterilized cotton • Drum of sterilized gauze • Box of roller gauze • A bottle with Dettol solution and (1:20) cheattle forceps • Jar of water which has been boiled and cooled • Ready lotion swabs.
Lower compartment	• Plain dissecting forceps (4-6 No.s)

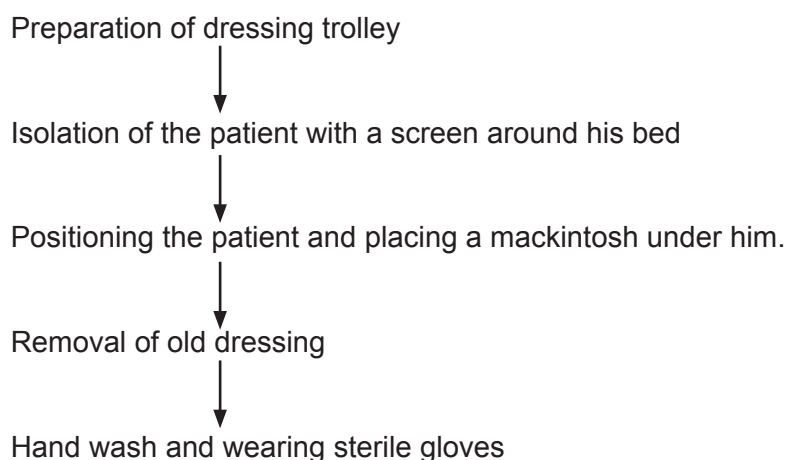
Side ring of upper compartment	• Toothed dissecting forceps • Artery forceps (4-6 No.s) • Sinus forceps • Probe • Clip removing forceps • Small bowls • Tray with pure Lysol and sharp instruments, such as the following ❖ Scissors ❖ Suture removing scissors ❖ Knife ❖ Needles(small and large) • Bottles containing the following: ❖ Hydorgen peroxide ❖ Gentian violet ❖ Eusol ❖ Bandage cutting scissor ❖ Kidney trays 8-10 ❖ Mackintosh (small to large) ❖ Sticking plaster ❖ Bandages tray ❖ Vaseline jar ❖ Tubes of antiseptic cream ❖ Bowl of lotion ❖ Bucket for waste.
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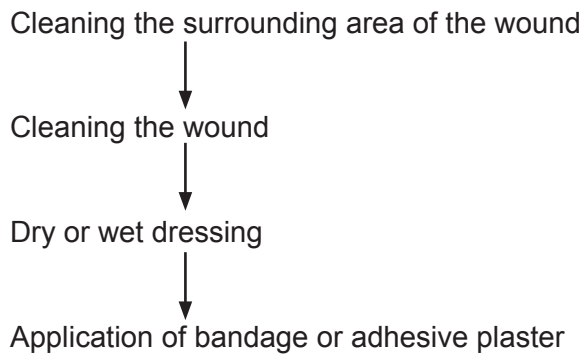
Things to Remember

1. Hands should be washed well before dressing a wound.
2. If more than one dressing is to be done, hands should be washed well before and after each dressing.
3. Dressing should be started after the ward has been cleaned well.
4. Clean wounds should be dressed first and dirty wounds should be dressed afterwards.

5. Dirty wounds require frequent dressings as per the doctor's instructions.
6. Time, energy, and things should be used without wastage.
7. Dressing material should not be used wastefully.
8. Stains of sticking plaster and lotions should be removed from the patient's skin with spirit
9. If the old dressing is adherent to the skin, it should not be pulled off with force because that is painful. It should be removed by application of ether to under surface in contact with the skin, or by moistening with saline.
10. Lotions should not be poured from a big bottle directly on the wound because it is possible that it may spill much in excess of the need.
11. Lotions like eusaol should not be used if they are old, because the chlorine in it has gone by that time and it is no more effective.
12. Bottles containing ether and spirit should have screw caps.
13. All bottles should have labels written in a legible hand. The following information should be mentioned on the label:
 - The name of the lotion
 - The strength of the lotion.
 - The contents are for external use only.
 - Name of the ward.
 - The word poison, if the lotion is poisonous when taken orally.

Steps for Dressing





Method

1. The dressing trolley is taken to the patient when it is properly arranged.
2. The method of dressing is explained properly to the patient and his relatives
3. A screen is placed around the patient
4. Appropriate position is given to the patient
5. Mackintosh is placed under the patient
6. Only the part required is exposed.
7. The old dressing is removed and put in the bucket for waste.
8. Hands are washed.
9. Gloves are washed.
10. Sterile towel is placed around the part to be dressed so as to prevent soiling of the patient's clothes and bedclothes.
11. The skin around the wound is first cleaned with detergent solution; holding the swabs with sponge – holding forceps
12. The swabs are moved from the centre to the periphery. Each swab is used only once.
13. Any adhesive transferred to the skin from the sticking plaster is removed with swabs soaked
14. The wound is cleaned
15. Dry or wet dressing is applied to the wound as per the doctor's instructions. It is covered with gauze and bandage or adhesive dressing is applied to it.

16. The used instruments are placed in a kidney tray.

Exrcise

1. Visit a nearby hospital and observe the types of dressing being done in the wards and fill the below table.

Type of Ward	Type of Dressing

2. Write the types of wound for which the following specific dressing is being done:

Types of Dressing	Types of wound
1 Adhesive dressing	
2 Non adhesive dressing	
3 Gauze dressing	
4 improvised dressing	
5 Antiseptic medicated dressing	

Assessment

I. Short Answer Questions

1. State the objectives of dressing?

2. Enlist the characteristics of good dressing?

3. What are the steps of dressing?

4. What are the general rules of dressing?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

1. Adhesive and non adhesive dressing
2. Gauze and Improvised dressing.

Part B

Discussed in class the following:

1. Rules for application of dressing
2. Steps of dressing
3. Types of dressing

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Demonstrate the knowledge of application of surgical dressing		
Demonstrate steps of dressing		

Notes

[illegible]

Sector: **Healthcare**

NSQF Level 3; Class XI

HSS304 - NQ2014

Handling Emergency Services

Student Workbook

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Session 1: Receiving Patients in Hospitals

In this session, you will learn about the duties of GDA during the admission of a patient in an emergency. You will also study the qualities to be possessed by GDA while handling emergencies and his/her responsibilities while discharging the patient.

Relevant Knowledge

Admission of a patient into a hospital can be a stressful experience. In this session, you will learn about the role and responsibilities of a GDA.

Emergency Patients Admission

The person accompanying the patient is required to go to Reception and complete an Admission Form on behalf of the patient. If it's an emergency referral from the Doctors, the Reception Clerk or GDA will take down the patient's details at casualty or escort them to the ward where details will be taken. The person accompanying the patient should inform the Admission Clerk/GDA of any medication the patient is taking.

A hospital environment can be a scary and unsettling place for children. It is usually advised to the parents to explain to their children why they are going to hospital, for example a check-up or assessment, a medical procedure, operation or treatment. They should tell the child about their trip to the hospital a few days or a week before admission. Answer any question of child and clear the doubt about the procedure to the best of your ability, keeping the language simple and easy to explain, e.g. - instead of using a term such as "put to sleep" when talking about anaesthesia, parent can talk about receiving a special sleeping medicine. Hospital staff should help answer any question a child may have. Allow bringing child's favourite toy or teddy bear for comfort.

Cell phones, jewellery, credit cards, contact lenses or any other valuables should not be brought into hospital. Bringing a small amount of money should be advised. No firearms should be allowed in the hospital premises.

GDA Duties During an Emergency

- Safely transferring patients to and from ambulance vehicles, using suitable equipment and manual handling skills.
- Carrying out basic scene safety checks by assessing the risk to self and others.
- Contacting the emergency control centre to request extra support.
- Carrying out basic diagnostic procedures under the direct supervision of a paramedic.
- Supporting the delivery of first aid and minor emergency treatments.

- Monitoring and treating patients until they are transferred to hospital.
- Helping ambulance paramedics deal with urgent hospital admissions.
- Helping to complete a handover report, recording all patient information.
- Communicating with patients and relatives with dignity and respect in often challenging circumstances.
- Attending to emotionally distressed patients in difficult situations. A GDA may occasionally face verbal aggression from people under the influence of alcohol or drugs.
- Monitoring and treating patients until they are transferred to hospital.

A GDA should possess the following qualities:

- A genuine desire to help and care for others
- Emotional resilience and physical stamina
- Good spoken and written communication skills
- Good listening skills and power of observation
- Good team working skills
- Ability to remain calm under pressure.

Discharge Procedure

Patients may be required to complete certain documentation provided by the ward staff. In addition, patient and relatives may be asked to fill a questionnaire to provide feedback. The patient is expected to go to reception and settle the bills for discharge. The GDA should assist the patient in the formalities involved in discharge of patient.

Exercise

1. Mr. Ravi has met with a serious road accident and was taken by 108 emergency ambulance to the hospital at 1:21 am. Perform a role play to demonstrate the tasks that should be performed by a GDA in such conditions.

Assessment

A. Short Answer Questions:

1. What are the duties of GDA in an emergency patient's admission?

2. Enlist the qualities to be possessed by GDA while handling emergencies

3. Write steps to be followed while admitting the emergency patient

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

1. Emergency and routine admission.
2. Emergency ward and general ward

Part B

Discussed in class the following:

1. Admitting the emergency patient
2. Duties of GDA in receiving patient in a hospital

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Demonstrate the knowledge of duties of GDA while admitting an emergency patient		

Session 2: Handling and Monitoring Patient

In this session, you will learn about the techniques of handling and monitoring the communication with patients, safety and security and triage of the patient. You will also study about the procedures of surge capacity and providing continual essential services to the patient.

Relevant Knowledge

Command and Control

A well-functioning command-and-control system is essential for effective hospital emergency-management operations. A hospital may designate command centre, i.e. a specific location prepared to convene and coordinate hospital-wide emergency response activities, equipped with effective means of communication. Hospital should ensure application of the basic principles and accepted strategies related to planning and implementing a hospital incident action plan. Implement or develop job action sheets that briefly list the essential qualifications, duties and resources required of by hospital managers and staff for emergency-response activities. Members have to be adequately trained on the structure and functions of the incident command system (ICS) and other hospital staff and community networks should be aware of their roles.

Communication Arrangements

Clear, accurate and timely communication is necessary to ensure informed decision-making, effective collaboration and cooperation, and public awareness and trust. The following actions are to be taken by the hospital authorities to ensure effective and timely communication.

- A public information spokesperson to coordinate communication with the public, the media and health authorities.
- A space is designated (outside the immediate proximity of the emergency department, triage/waiting areas and the command centre) for press conferences.
- Draft of brief key messages is always kept ready for target audiences (e.g. patients, staff, public) in preparation for the most likely disaster scenarios.
- All communication to the public, media, staff (in general) and health authorities are approved by the hospital superintendent.
- Mechanisms of information exchange between hospital administration, department/unit heads and staff.
- Establish mechanisms for the appropriate and timely collection, processing and reporting of information to supervisory stakeholders (e.g. the government, health authorities), and through them to neighbouring hospitals, private practitioners and

hospital networks.

- Ensure that all decisions related to patient prioritization (e.g. adapted admission and discharge criteria, triage methods, infection prevention and control measures) are communicated to all relevant staff and stakeholders.
- Ensure the availability of reliable and sustainable primary and back-up communication systems (e.g. satellite phones, mobile devices, landlines, Internet connections, pagers, two-way radios, unlisted numbers), as well as access to an updated contact list.

Safety and Security

Well-developed safety and security procedures are essential for the maintenance of hospital functions and for the incident response operations during a disaster. The following actions are generally taken by the hospitals for the safety and security of patients:

- Appoint a hospital security team responsible for all hospital safety and security activities.
- Prioritize security needs in collaboration with the hospital.
- Identify areas where increased vulnerability is anticipated (e.g. entry/exits, food/water access points, pharmaceutical stockpiles).
- Ensure the early control of facility access point(s), triage site(s) and other areas of patient flow, traffic and parking.
- Limit visitor access as appropriate.
- Establish a reliable mode of identifying authorized hospital personnel, patients and visitors.
- Provide a mechanism for escorting emergency medical personnel and their families to patient care areas.
- Ensure that security measures required for safe and efficient hospital evacuation are clearly defined.
- Ensure that the rules for engagement in crowd control are clearly defined.
- Solicit frequent input from the hospital security team with a view to identifying potential safety and security challenges and constraints, including gaps in the management of hazardous materials and the prevention and control of infection.
- Identify information insecurity risks.

- Implement procedures to ensure the secure collection, storage and reporting of confidential information.
- Define the threshold and procedures for integrating local law enforcement and military in-ospital security operations.
- Establish an area for radioactive, biological and chemical decontamination and isolation.

Triage

Maintaining patient triage operations on the basis of a well-functioning mass-casualty triage protocol is essential for patient care. The hospital authorities should take the following actions:

- An experienced triage officer should be designated to oversee all triage operations (e.g. a trauma or emergency physician or a well-trained emergency nurse in a supervisory position).
- Ensure that areas for receiving patients, as well as waiting areas, are effectively covered, secured from potential environmental hazards and provided with adequate work space, lighting and access to auxiliary power.
- Ensure that the triage area is in close proximity to essential personnel, medical supplies and key care services (e.g. the emergency department, operative suites, the intensive care unit).
- Ensure that entrance and exit routes to/from the triage area are clearly identified.
- Identify a contingency site for receipt and triage of mass-casualties.
- Identify an alternative waiting area for wounded patients.
- Establish a mass-casualty triage protocol based on severity of illness/injury, survivability and hospital capacity that follows internationally accepted principles and guidelines.
- Establish a clear method of patient triage identification; ensure adequate supply of triage tags.
- Identify a mechanism whereby the hospital emergency response plan can be activated from the emergency department or triage site.
- Ensure that adapted protocols on hospital admission, discharge, referral and operative suite access are operational when the disaster plan is activated to facilitate efficient patient processing.

Surge Capacity

Surge capacity, defined as the ability of a health service to expand beyond normal capacity to meet increased demand for clinical care, is an important factor of hospital disaster response and should be addressed early in the planning process. Consider taking the following actions:

- Calculate maximal capacity required for patient admission and care based not only on total number of beds required but also on availability of human and essential resources and the adaptability of facility space for critical care.
- Estimate the increase in demand for hospital services, using available planning assumptions and tools.
- Identify methods of expanding hospital inpatient capacity (taking physical space, staff, supplies and processes into consideration).
- Designate care areas for patient overflow (e.g. auditorium, lobby).
- Increase hospital capacity by outsourcing the care of non-critical patients to appropriate alternative treatment sites (e.g. outpatient departments adapted for inpatient use, home care for low-severity illness, and chronic-care facilities for long-term patients).
- Verify the availability of vehicles and resources required for patient transportation.
- Establish a contingency plan for inter-facility patient transfer, in case traditional methods of transportation become unavailable.
- Identify potential gaps in the provision of medical care, with emphasis on critical and emergent surgical care.
- Identify additional sites that may be converted to patient care units (e.g. convalescent homes, hotels, schools, community centres, gyms).
- Adapt hospital admission and discharge criteria and prioritize clinical interventions according to available treatment capacity and demand.
- Designate an area for use as a temporary morgue. Ensure the adequate supply of body bags. Human Resource Management

Effective human resource management is essential to ensure adequate staff capacity and the continuity of operations during any incident. The hospital authorities take the following action to effectively manage the human resource in the hospital:

- Update the hospital staff contact list.

- Estimate and continuously monitor staff absenteeism.
- Establish a clear staff sick-leave policy, including contingencies for ill or injured family members or dependants of staff.
- Identify the minimum needs in terms of health-care workers and other hospital staff to ensure the operational sufficiency of a given hospital department.
- Establish a contingency plan for the provision of food, water and living space for hospital personnel.
- Prioritize staffing requirements and distribute personnel accordingly.
- Recruit and train additional staff (e.g. retired staff, reserve military personnel, university affiliates/students and volunteers) according to the anticipated need.
- Address liability, insurance and temporary licensing issues relating to additional staff and volunteers who may be required to work in areas outside the scope of their training or for which they have no license.
- Establish a system of rapidly providing health-care workers (e.g. voluntary medical personnel) with necessary credentials in an emergency situation, in accordance with hospital and health authority policy.
- Cross-train health-care providers in high-demand services (e.g. emergency, surgical, and intensive care units).
- Provide training and exercises in areas of potential increased clinical demand, including emergency and intensive care, to ensure adequate staff capacity and competency.
- Identify domestic support measures (e.g. travel, child care, care for ill or disabled family members) to enable staff flexibility for shift reassignment and longer working hours.
- Ensure that staffs dealing with epidemic-prone respiratory illness are provided with the appropriate vaccinations, in accordance with national policy and guidelines of the health authority.

Logistics and Supply Management

Continuity of the hospital supply and delivery chain is often an underestimated challenge during a disaster, requiring attentive contingency planning and response. The hospital authorities are required to:

- Develop and maintain an updated inventory of all equipment, supplies and pharmaceuticals

- Estimate the consumption of essential supplies and pharmaceuticals
- Consult with authorities to ensure the continuous provision of essential medications and
- Assess the quality of contingency items prior to purchase
- Establish contingency agreements with vendors to ensure the procurement and prompt delivery of equipment, supplies and other resources in times of shortage.
- Identify physical space within the hospital for the storage and stockpiling of additional supplies, taking ease of access, security, temperature, ventilation, light exposure, and humidity level into consideration.
- Stockpile essential supplies and pharmaceuticals in accordance with national guidelines.
- Define the hospital pharmacy’s role in providing pharmaceuticals to patients being treated at home or at alternative treatment sites.
- Coordinate a contingency transportation strategy with hospital networks and transportation services to ensure continuous patient transferral.

Exercise

- 1 . Visit a nearby hospital and observe the staff in controlling and commanding during the handling of the patient. Identify their role in handling of patient and fill the table given below:

Designation of staff	Role in handling of patient

2. Make a report on logistics and supply management of the hospital

Assessment

A. Short Answer Questions:

1. What is the significance of command and control system in a hospital?

2. What strategy should be implemented for effective communication in handling and monitoring the patient?

3. Explain safety and security procedures that should be followed by hospital

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Surge capacity and normal capacity
- 2. Logistics and supply management.

Part B

Discussed in class the following:

- 1. Role of GDA in handling and monitoring of patient.
- 2. Human resource management in a hospital
- 3. Action to be taken by hospital for management of human resource

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Identify the techniques of handling and monitoring communication with patients		
Demonstrate the knowledge of management of human resources in the hospital		

Session 3: Transportation of Injured Patient

In this session, you will learn about moving an injured patient to and within the hospital. You will learn about the procedures of internal and external transportation and various methods of triage during transportation.

Relevant Knowledge

The hospital transportation system can be divided into two groups:

1. Internal transportation (Intramural transportation)
2. External transportation (Extramural transportation)

Internal Transportation

Internal transportation includes use of trolleys, stretchers, lifts, escalators, etc. for transporting patients, equipment and supplies.

External Transportation

It will include ambulances, relief van, train, ambulance train, car, rickshaws, bicycles, bullock, cart, helicopter, aircrafts, horses, mules, manual laborers etc. it will depend upon the situation and economic status of the patients or his relatives. Sometimes the patient's relatives are so emotionally attached even they transport the patient by chartered plane.

General Principles of Transportation

1. The aim of transportation is to enable the victim to reach the destination without deterioration of his condition.
2. A severely injured or ill person should not move unless there is immediate danger to his life or skilled help is not available. It may result in aggravation of his or her injury or condition.
3. Do not presume that a victim can sit or stand without support.
4. If there is a risk to your life at the site of the mishap, move the casualty as quickly as possible without endangering your life.
5. The method of transportation depends upon nature of injury and its severity.
6. Confirm that everyone understates the steps done in transportation.
7. Follow the triage in transportation.

- 8. The position assumed by casualty or in which he has been placed must not be distanced unnecessarily.
- 9. Watch the general condition carefully while transporting the patient.
- 10. Watch dressing carefully throughout the transport.
- 11. Watch recurrence of hemorrhage.
- 12. Transport must be safe steady and speedy.

Triage during Transportation

Category	What this means	What you can do
I	Highest priority for immediate help to those people who need surgery	Help to evacuate and safely transport to medical center
II	Low priority minor injury	Comfort the dying
III	Need your First Aid but can wait safely for surgery	Give First Aid and arrange for transportation

Triage in Treatment (First Aid & Transportation) .

1. Red tag (highest priority)

- Respiratory arrest, airway abstenion severe breathing difficulty.
- Cardiac arrest
- Severe hemorrhage and shock
- Open chest wound open abdomen wound
- Burn involving respiratory tract
- Unconsciousness coma
- Heart attack
- Poisoning

2. Green tag (2)

- Severe burn
- Spinal injury
- Moderate hemorrhage
- Multiple fracture

- Head injuries

3. White tag (honest)

- Minor fracture
- Minor bleeding
- Moderate or minor burns.

Label a Casualty

C – Contaminated by persistent gas

H – Hemorrhage severely

M – Morphine given (time & dose should be written)

P – Phosphorus burn

R – Radio cline exposure

T- Tourniquet applied (time of apply & subs nut release should be indicated) nd priority)

X – Urgent or emergence

XX- Poisoned by nerve gas or nonresistant gas

Care before Transportation

- Remove the casualty from danger.
- Perform a quick heed to toe examination to prevent further injury and support injured part.
- Perform First Aid.

Methods of Caring

The methods of transport depends upon

1. Nature and severity of injury.
2. Number of helper and facilities available.
3. Distance to shelter\ hospital.
4. Nature of route to be covered.

Correct Posture

1. Keep your back straight and head erect and hold the casualty close to your body using your

2. If the casualty signs to slip from hands, do not injure your own back by trying to prevent the shoulders to support the weight. casualty falling. Let the casualty slide slowly and gently to the ground without causing more danger to the injured area.
3. When lifting, it is important to keep your back straight and bend at knees.

Manual Methods of Lifting and Carries

Carries for One First Aider

1. Cradle method: It is used when the victim weight is less or is a child. Carry the victim comfortably from below the shoulder and knees with the hands.
2. Drag method: Pull the victim along the ground while lifting him/her. Fold the victim's arms across the chest and behind his shoulder, grasp the armpits, cradle the heel on your forearms and drag him along the ground. It is used when the victim is unable to stand and must be moved.
3. Human crutch: Stand at the victim's injured site. Place his nearest arm around your neck and hold it with your free hand. Put your other arm around his waist and grasp his clothes for additional support. It is used to support a conscious victim who is able to walk with support.
4. Pick a back: If the casualty is small, light, conscious and able to hold on to you carry in the pick a back fashion.
5. Fireman's lift: It is used to move a conscious or on conscious child or a light weight adult when a hand has to be kept free. Help the casualty in standup. If the casualty is unconscious or unable to stand, turn the casualty face down and stand at the head. Place your arms under his armpits and raise him onto the knees and then the feet. Grasp his right wrist with your left hand. Bend down with your head under his extended right arm so that your shoulder is level with the lower part of his abdomen. Allow him to fall gently across your shoulder. Place your right arm between or around his legs. Stand up, taking his weight on your right shoulder. Gently pull the victim across both shoulders.

Carrier for Two First Aider

1. Four handed seat method: It is used to carry a conscious casualty who can use one or both upper limbs to hold. Stand facing each other behind the victim. Make a seat by grasping your own wrist with your right hand, and your partner's right wrist with the free hand. Stoop down. Instruct the victim to sit back on to your hands, to place his arm around your necks to steady him.
2. Two handed seat method: It is used to carry a victim who is unable to assist the bearers in his transportation e.g. a hand. Squat facing each other on either side of the victim. Pass your hands nearest the victim under and around the back just below his shoulder, grasping each other arms under the middle of his light and

grasp each other's wrists. Rise together step off with the outside feet and walk as usual.

3. Fore and after carry: It is used when there is no sufficient space for the use of a chair. Supporting the victim on both sides. Help him to sit up and fold the arms across his chest. Go behind the victim and place the thumb and under his armpits and grasp his wrist. Get the other first aider to remain at the victim's side and place one arm under thighs lift him on to the chair together.
4. Chair method: It is used for conscious victim without serious injury. Place the victim on sturdy chair and secure him in position with broad bandage. Stand facing each other, one in front of him and the other behind him hold the back and the front legs of the chair and carry him.
5. Blanket lift: Used when victim lying on a blanket or a bed sheet. Fold it on both sides and lift up the victim by holding the corners of the blanket place him on a stretcher.
6. Improvised method: Open the buttons of the victim's shirt. Open the flaps of his shirt and catch their corners. Get other helpers to hold his heel and legs. Then lift and carry him to a stretcher.

Transport a patient by two persons using a stick.

Carry chair

Carry the victim on foldable chair. The chair should have canvas seat, wheels move freely, safety strap and strong enough.

Transportation by Stretcher

It is used for seriously ill or injured victim.

Types

1. Farley stretcher (general stretcher)
2. Utile stretcher (foldable from middle)
3. Pale and canvas stretcher.
4. Scoop (orthopaedic) stretcher.
5. Trolley bed (general with trolley)
6. Neil Robertson stretcher (used for rescue purpose)
7. Para guard stretcher (foldable above)
8. mprovised stretcher

Carrying a loaded stretcher

1. Head should be higher than the feet.

2. Carries feet first except in following situations:

- When carrying a victim to the side or of a bed.
- When going down hills are when the victim lower limbs are injured or there is hyposthenia
- When loading a victim into an ambulance.

Exercise

1. Visit a nearby hospital and observe the transportation of patient on stretcher. Fill the table given below with type of stretcher used for transportation for different patient

Type of Stretcher	Condition of the Patient	Label of Casualty

2. Tabulate the diseases covered under the following tags:

Red Tag	Green Tag	White Tag

3. Perform a role play demonstrating the following methods of manual lifting of patient

1. Cradle method
2. Drag method
3. Human crutch
4. Pick a back
5. Fireman"s lift

Assessment

A. Short Answer Questions:

1. Explain the care required before transporting a patient

2. State the difference between internal and external transportation

3. State general principles of transportation

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Internal and External Transportation
- 2. Red tag, Green tag and White tag Triage.
- 3. Cradles and drag method of lifting.

Part B

Discussed in class the following:

- 1. Method of lifting the patient
- 2. Types of stretcher
- 3. Maintaining correct posture during transportation of patient

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Transport an injured patient following the basic principles and precautions for care		
Apply different types of tags of triage		
Demonstrate different methods of lifting the patient		

Session 4: Methods of Immobilization

In this session, you will learn about immobilization, types of immobilization and their methods. You will also study about the types of casting and traction.

Relevant Knowledge

The general aim of early trauma management is to control hemorrhage, provide pain relief, prevent ischemia-reperfusion injury, and remove potential sources of contamination (foreign body and nonviable tissues). Once these are accomplished, the trauma should be reduced and the reduction should be maintained, which will optimize the conditions for fracture union and minimize potential complications.

The goal in managing trauma is to ensure that the involved body parts, when healed, have returned to its maximal possible function. This is accomplished by obtaining and subsequently maintaining a reduction of the trauma with an immobilization technique that allows the fracture to heal and, at the same time, provides the patient with functional aftercare.

Types of Immobilization

1. Non-operative
T
2. TSurgical

1. Non-operative (Closed) Therapy

Non-operative (closed) therapy performed initially for any fracture that is displaced, shortened, or angulated. This is achieved by applying traction to the long axis of the injured limb and then reversing the mechanism of injury/fracture, followed by subsequent immobilization through casting or splinting. Nonoperative (closed) therapy consists of casting and traction (skin and skeletal traction).

Casting

It is also known as orthopaedic cast, body cast, plaster cast, or surgical cast. It is a shell, frequently made from plaster, encasing a limb (or, in some cases, large portions of the body) to stabilize and hold anatomical structures, most often a broken bone (or bones) in place until healing is confirmed. It is similar in function to a splint.



Plaster bandages consist of a cotton bandage that has been combined with plaster of paris, which hardens after it has been made wet. Plaster of Paris is calcined gypsum (roasted gypsum), ground to a fine powder by milling. When water is added, the more soluble form of calcium sulfate returns to the relatively insoluble form, and heat is produced.

Types of casting

Upper Extremity Casts (Arm Cast)

Upper extremity casts are those which encase the arm, wrist, and/or hand. A long arm cast encases the arm from the hand to about 2 inches below the arm pit, leaving the fingers and thumbs free. A short arm cast, in contrast, stops just below the elbow. Both varieties may, depending on the injury and the doctor's decision, include one or more fingers or the thumb, in which case it is called a finger spica or thumb spica cast.

Lower Extremity Casts



Lower extremity casts are classified similarly, with a cast encasing both the foot and the leg to the hip being called a long leg cast, while a cast encasing the patient's foot, ankle and lower leg ending below the knee is referred to as a short leg cast. A walking heel may be applied for ambulation. These heels, when properly applied, elevate the toes

and offer the wearer the advantage of keeping the toes out of the dirt and moisture of the street. The walking heel provides a small contact patch for the cast and creates a fluid rocking motion during the stride and allows the cast to pivot easily in any direction.



Cylinder Cast

In some cases, a cast may include the upper and lower arm and the elbow, but leave the wrist and hand free, or the upper and lower leg and the knee, leaving the foot and ankle free. Such a cast may be called a cylinder cast, or may simply be called a long arm or long leg cast.

Body Cast

Body casts, which cover the trunk of the body, and in some cases the neck up to or including the head or one or more limbs, are rarely used today, and are most commonly used in cases of small children, who cannot be trusted to comply with a back brace, or in cases of radical surgery to repair an injury or other defect. A body cast which encases the trunk (with "straps" over the shoulders) is usually referred to as a body jacket. These are often very uncomfortable.

Spica Cast

A cast which includes the trunk of the body and one or more limbs is called a spica cast, just as a cast which includes the "trunk" of the arm and one or more fingers or the thumb. For example, a shoulder spica includes the trunk of the body and one arm, usually to the wrist or hand. Shoulder spicas are almost never seen today, having been replaced with specialized splints and slings which allow early mobility of the injury so as to avoid joint stiffness after healing. A hip spica includes the trunk of the body and one or more legs.

A hip spica which covers only one leg to the ankle or foot may be referred to as a single hip spica, while one which covers both legs is called a double hip spica. A one-and-a-half hip spica encases one leg to the ankle or foot and the other to just above the knee. The extent to which the hip spica covers the trunk depends greatly on the injury and the surgeon; the spica may extend only to the navel, allowing mobility of the spine and the possibility of walking with the aid of crutches, or may extend to the rib cage or even to the armpits in some rare cases. Hip spicas were formerly common in reducing femoral fractures, but today are rarely used except for congenital hip dislocations, and then mostly while the child is still an infant.

In some cases, a hip spica may only extend down one or more legs to above the knee. Such casts, called pantaloon casts, are occasionally seen to immobilize an injured lumbar spine or pelvis, in which case the trunk portion of the cast usually extends to the armpits.

Splint

A splint is a device used for support or immobilization of a limb or the spine. It can be used:

- Emergency medical services or volunteer first responders to temporarily immobilize a fractured limb before transportation;

- Allied health professionals to immobilize an articulation (e.g. the knee) that can be freed while not standing (e.g. during sleep);
- Athletic trainers to immobilize an injured bone or joint to facilitate safer transportation of the injured person;
- Emergency room Physicians to stabilize fractures or sprains until follow-up appointment with an orthopaedist.

In most emergency rooms, a fibreglass splinting material, called Orthoglass, is commonly used for the following reasons:

- It is clean, unlike most plaster splinting materials
- It comes in rolls and can be easily measured and cut according to the patient's dimensions.
- It comes pre-padded, which saves time and energy trying to roll out padding.
- It dries in about 20 minutes, and there are no risks for burns involved.

Contraindication of Closed Reduction :

Closed reduction is under the following conditions:

- Undisplaced fractures

- If displacement exists but is not relevant to functional outcome (eg., humeral shaft fracture where the shoulder and elbow motion can compensate for residual angulation)
- If reduction is impossible (severely comminuted fracture)
- If the reduction, when achieved, cannot be maintained
- If the fracture has been produced by traction forces (eg., displaced patellar fracture)



Traction

For hundreds of years, traction has been used for the management of fractures and dislocations that cannot be treated by casting. With the advancement in orthopaedic implant technology and operative techniques, traction is rarely used for definitive fracture/dislocation management.

Types of Traction

There are two types of traction:

1. Skin traction
2. Skeletal traction

Skin Traction

In skin traction, traction tapes are attached to the skin of the limb segment that is below the fracture or a foam boot is securely fitted to the patient's foot. When applying skin traction, or Buck traction, usually 10% of the patient's body weight (up to a maximum of 10 lb) is recommended. At weights greater than 10 lb, superficial skin layers are disrupted and irritated. Because most of the forces created by skin traction are lost and dissipated in the soft-tissue structures, skin traction is rarely used as definitive therapy in adults, rather it is commonly used as a temporary measure until definitive therapy is achieved.

Skeletal Traction

In skeletal traction, a pin (e.g. Steinmann pin) is placed through a bone distal to the fracture. Weights are applied to this pin, and the patient is placed in an apparatus to facilitate traction and nursing care. Skeletal traction is most commonly used in femur fractures. A pin is placed in the distal femur or proximal tibia 1-2 cm posterior to the tibial tuberosity. Once the pin is placed, a Thomas splint is used to achieve balanced suspension.

Purpose of Traction

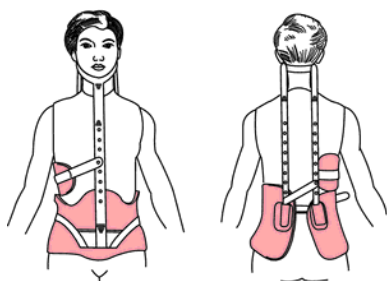
The purpose of traction is to:

- Regain normal length and alignment of involved bone
- Lessen or eliminate muscle spasms
- Relieve pressure on nerves, especially spinal and
- Prevent or reduce skeletal deformities or muscle contractures
- To provide a fusiform tamponade around a bleeding vessel

Types of Skeletal Traction

Traction procedures are largely replaced now by more modern techniques, but certain approaches are still used today. Some of these have been discussed here to make you understand the importance of skeletal traction in children and adults.

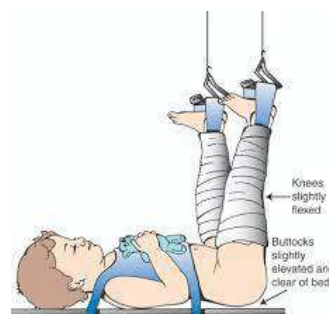
Milwaukee Brace:



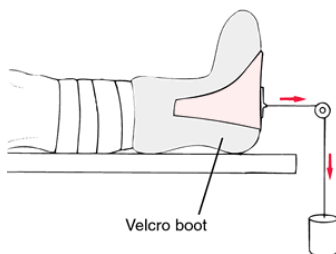
The Milwaukee brace, also known as a cervico-thoraco-lumbo-sacral orthosis or CTLSO, is a back brace used in the treatment of spinal curvatures (such as scoliosis or kyphosis) in children. It is a full-torso brace that extends from the pelvis to the base of the skull. It was originally designed by Blount and Schmidt in 1946 for postoperative care when surgery required long periods of immobilization.

Bryant's Traction

Bryant's traction is a form of orthopedic traction. It is mainly used in young children who have fractures of the femur or congenital abnormalities of the hip. Both the patient's limbs are suspended in the air vertically at a ninety degree angle from the hips and knees slightly flexed. Over a period of days, the hips are gradually moved outward from the body using a pulley system. The patient's body provides the counter-traction.



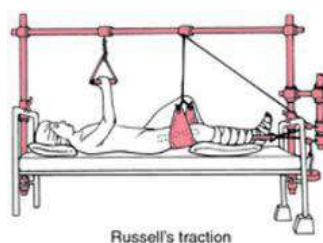
Buck's Traction



Buck's traction involves skin traction. It is widely used for femoral fractures, low back pain, acetabular fractures and hip fractures. Skin traction rarely causes fracture reduction, but reduces pain and maintains the length of the bone.

Russell's Traction

A unilateral or a bilateral orthopedic mechanism combines suspension and traction to immobilize, position, and align the lower extremities in the treatment of fractured femurs, hip and knee contractures, and disease processes of the hip and knee. Russell's traction is applied as adhesive or non-adhesive skin traction and uses a sling to relieve the weight of the lower extremities subjected to traction pull. A jacket restraint is often incorporated to help immobilize the patient.



Dunlop Traction



Dunlop traction is an orthopedic mechanism consisting of adhesive or non-adhesive skin traction that helps immobilize the upper limb in the treatment of contracture or supracondylar fracture of the elbow. The mechanism uses a system of traction weights, pulleys, and ropes, usually applied unilaterally but sometimes bilaterally.

Spinal Decompression

Spinal traction as a means of spinal decompression is often applied without directly touching bones as other methods of traction do. This is sometimes isolated inside-out by inflatable girdles or use of the transversus abdominis muscle. It is also done in conjunction with thigh-supported flexed-hip traction (inversion chairs, back hyperextensions) or done in conjunction with whole-leg traction (boots, tables) via inverted forms of suspension. Traction of the spine (ignoring the cervical) also occurs with upright suspension, such as with pull-ups (exercise), dips (exercise), captain's chair, chin-ups (chin up exercise) or other fitness movements with the feet dangling.

Responsibility of Initial Application

In most cases traction is only one part of the treatment plan of a patient needing such therapy. The physician's order will contain:

- Type of traction
- Amount of weight to be applied
- Frequency of neurovascular checks if more frequent than every four hours
- Site care of inserted pins, wires, or tongs
- The site and care of straps, harnesses and halters
- The inclusion of any other physical restraints / straps or appliances (e.g., mouth guard)
- The discontinuation of traction

The physician is typically responsible for initial application of traction and weights while the adjustment or removal (to perform ablution functions / physiotherapy) of skeletal traction weights will be based on the doctor's charted plan.

In most cases cervical traction may be adjusted or temporarily removed as per physician

order by an orthopedic nurse who has the competency to do so. The alignment and moving of the patient will only be changed on physician's directive and the affected extremity will need to be maintained in proper alignment at all times with the ropes and traction straps - making sure the mentioned is unobstructed and weights hanging freely.

If it is necessary to move the patient while skeletal traction is in place, the patient should be moved in the bed with weights hanging freely.

In most cases traction will be applied for a number of weeks to months and neurovascular checks will need to be performed by a nurse as ordered by the physician or as per traction unit policy.

Traction is an appropriate treatment for a number of medical problems including spinal deformities such as scoliosis.

Exercise

- 1. Visit a nearby hospital and fill the table given below with type of casting according to condition of the patient.

Types of Casting	Condition of the Patient

- 2. Visit a nearby hospital and fill the table given below with type of traction according to condition of the patient

Type of Traction	Condition of the Patient

Assessment

A. Short Answer Questions:

1. What is Immobilization?

2. Explain the significance of the use of splint

3. Explain the types and purpose of traction?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Casting and splinting.
- 2. Skin and skeletal traction.
- 3. Bryant"s and Buck"s traction.

Part B

Discussed in class the following:

- 1. Purpose of traction
- 2. Use of Casting
- 3. Immobilization Techniques
- 4. Role of General Duty Assistant in Immobilization

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Demonstrate the knowledge of application of differen types of casting		
Identify the different types of splint		

Session 5: Prevention of Injuries

In this session, you will learn about the common types of injuries and associated risk factors with a child. You will also study about the development stage of the child at different ages along with the advices for parents. Prevention methods from accidents, falls, fires, scales, burns, glass related accidents, poisoning, suffocating and choking is also mentioned in this session.

Relevant Knowledge

Accidental injuries are a major health problem throughout the world. They are the most common cause of death in children over one year of age. Every year they leave many thousands permanently disabled or disfigured. More than one million children under the age of 15 experience accidents in and around the home every year, for which they are taken to accident and emergency units. Those most at risk from a home accident are the 0-4 year's age group. Falls account for the majority of non-fatal accidents while the highest numbers of deaths are due to fire. Most of these accidents are preventable through increased awareness, improvements in the home environment and greater product safety.

Common Types of Injuries

The most severe injuries are associated with heat-related accidents and falls from a height. Older children are more likely to sustain fractures than younger counterparts. Younger children have a higher percentage of burns and scalds as well as poisoning and ingestion accidents. Childhood injuries are closely linked with social deprivation. Children from poorer backgrounds are five times more likely to die as a result of an accident than children from better off families - and the gap is widening. The largest number of accidents happens in the living/dining room. However, the most serious accidents happen in the kitchen, on the stairs and besides road.

Factors responsible for Injuries

Factors, such as stress, death in the family, negligence chronic illness or homelessness increase the likelihood of the child having an accident. Distractions and inadequate supervision are often the cause of accidents. Poor housing and overcrowded conditions lead to increased numbers of accidents. Some accidents are caused by lack of familiarity with surroundings, for example, when visiting friends or relatives, or in holiday accommodation. Children have a limited perception of the environment because of their lack of experience or development. They are not aware of the consequences of the many new situations that they encounter daily.

The various factors that could increase the proneness of a child to accidents include the following:

- Small stature: This may prevent a child from seeing above an obstruction or being seen by an adult.

- Inquisitiveness: Curiosity and a spirit of adventure may lead a child into danger.
- Bravado and horseplay: Boys are particularly prone to showing off and over reaching their abilities, especially among friends. Many accidents are caused by horseplay involving pushing, shoving and wrestling.
- Stress: Tensions at home and emotional upsets caused by temper, jealousy and over excitement may cause a child to run blindly into danger. Such action may even be deliberate to seek attention.
- Inexperience: A child's interpretation of a situation may be inaccurate and adults looking after small children should be aware not to expect too much of them.
- Inadequate supervision: Children need constant supervision. Medicines, pills and toxic substances should be locked away and fires and stairs should be guarded.

Safety and Child Development

Children differ in their rate of development but the information below is a guide for parents to take necessary actions for ensuring the safety of children at various stages of development.

Age	Development	Advice for parents
0-6 months	Wriggle and kick, grasp, suck, roll over.	Do not leave on a raised surface.
6mths-1 yr	Stand, sit, crawl, put things in mouth.	Keep small objects and dangerous substances out of reach
1-2 years	Move about, reach things high up, and find hidden objects, walk, and climb.	Never leave alone, place hot drinks out of reach, use a fireguard and stair gates
2-3 years	Be adventurous, climb higher, pull and twist things, watch and copy. Be a good role model and be watchful	Place matches and lighters out of sight and reach.
3-4 years	Use grown-up things, be helpful, understand instructions, be adventurous, explore, and walk downstairs alone.	Continue to be a good role model, keep being watchful but start safety training.
4-5 years	Play exciting games, can be independent, ride a bike, enjoy stories	They can actually plan to do things and carry it out. Rules are very important to them as long as everybody keeps to the same ones. They enjoy learning. Continue safety training.
5-8 years	Will be subject to peer pressure and will still forget things.	Still need supervision, guidance and support.

General safety advice are as follows:

- Children should be supervised at all times
- Keep floors free of toys and obstructions that can be tripped over
- Always use a securely fitted safety harness in a pram, pushchair or highchair
- Never leave babies unattended on raised surfaces
- Do not place baby bouncers on raised surfaces - they could fall off with the movement of the baby

Prevention of falls

- Never leave tripping hazards on the stairs
- Stairs should be carefully maintained - damaged or worn carpet should be repaired or removed
- Make sure balustrades are strong and do not have any footholds for climbing
- Stairs should always be well lit
- Fit child resistant window restrictors but make sure you can get out easily in an emergency
- Do not put anything under the window that can be climbed on
- Furniture and tall kitchen appliance at risk from being pulled over should be secured to the wall.

Prevention of Fire

- Keep matches and lighters out of sight and reach of children
- Extinguish and dispose of cigarettes properly
- Have an escape route planned, and practice it, in case of fire
- Fit a smoke alarm which complies with BS EN 14604 2005 and check it regularly

Scalds and Burns

Hot drinks cause most scalds to children under the age of five. A child's skin is much more sensitive than an adult's and a hot drink can still scald a child 15 minutes after being made. Young children are also very vulnerable to sunburn.

Hot bath water is responsible for the highest number of fatal and severe scalding injuries among young children. Children can also suffer burns after contact with open fire, a cooker, iron, curling tongs hair straighteners, cigarettes, matches, cigarette lighters and many other hot surfaces.

Prevention

- Never hold a hot drink and a child at the same time
- Never leave young children alone in the bathroom
- Put hot drinks out of reach and away from the edges of tables and worktops
- Encourage the use of a coiled flex or a cordless kettle
- Keep small children out of the kitchen whenever possible
- Run the domestic hot water system at 46°C or fit a thermostatic mixing valve to taps
- When running a bath turn the cold water on first and always test the water temperature with your elbow before letting a child get into the bath or shower
- Always use rear hotplates and turn the panhandles away from the front of the cooker
- Keep hot irons, curling tongs and hair strengtheners out of reach even when cooling down.

Glass-Related Accidents

The increased use of glass in the home has led to more glass related accidents. Every year children die following an accident with architectural glass. Many children are also injured when glass tumblers and bottles break.

Prevention

- Use of safety glass to like laminated, toughened or glass which passes the impact test in all replacement windows and doors - especially at low level. Laminated glass is good for safety and security
- Make existing glass safer by applying shatter resistant film
- When buying furniture which incorporates glass, look for approval
- Always clear up broken glass quickly and dispose of it safely

Poisoning

Most poisoning accidents involve medicines, household products and cosmetics. Some poisoning agents can cause breathing difficulties - seek medical attention immediately. More than 28,000 children receive treatment for poisoning, or suspected poisoning accidents every year.

Prevention

- Keep medicines and chemicals out of sight and reach of children, preferably in a locked cupboard
- Wherever possible, buy products in child resistant containers
- Always store chemicals in their original containers
- Dispose off unwanted medicines and chemicals safely
- Avoid buying plants with poisonous leaves or berries or those that can irritate the skin.

Suffocating and Choking



Children can swallow, inhale or choke on items such as small toys, peanuts and marbles. Nappy sacks used to dispose of soiled nappies can also pose a risk to babies and young children. Babies sometime have suffocated after a nappy sack covered their mouth and nose, or have choked after putting a nappy sack in their mouth. Parents and caretakers are generally aware of the dangers posed

by plastic bags, but may not make the link to nappy sacks pose similar risks. Nappy sacks or bags tend to be fragranced and are made of much more flimsy material and do not rustle in the same way as plastic bags meaning they can be easily grasped and breathed in by young babies. Babies and small children are most at risk from choking because they explore things around them and put them in their mouth.

Prevention

- Choose toys appropriate to the age of the child
- Ensure that small objects such as marbles and peanuts and small toys are kept out of reach of children
- Encourage older children to keep their toys away from their younger playmates
- Pull cords on curtains and blinds should be kept short and kept out of reach
- Keep animals, especially cats, out of the bedroom and use a net on a pram

- Keep nappy sacks out of the reach of babies and young children
- Never store nappy sacks in or around the cot or pram.

Exercise

1. Observe different children of different age. Note down the developmental milestone among the following age of children given in the table:

Age	Development
0-6 months	
6mths-1 yr	
1-2 years	
2-3 years	
3-4 years	
4-5 years	
5-8 years	

2. Tabulate the types of accidents/injuries that could happen with a child along with the location/places and respective prevention methods

Type of Accident/Injury	Location that makes a child prone to Accident/Injury	Preventive Methods

Assessment

A. Short Answer Questions:

1. What are the risk factors associated with accidents at home?

2. How children are prone to get poisoning?

3. What is suffocation and choking?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Suffocation and choking

Part B

Discussed in class the following:

- 1. Common types of accidents/injuries
- 2. Safety and child development

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Demonstrate the knowledge of injuries associated with children		
Identify the hazards and preventive methods adopted for fire, falls, scales, burns, glass related accidents, poisoning, suffocation and choking		

Notes

[illegible]

Sector: **Healthcare**

NSQF Level 3; Class XI
HSS305 - NQ2014
Administration of Medication

Student Workbook

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Session 1: Basic Principles of Drug Administration

In this session, you will learn about the classification of medicines, the seven rights during assisting the drug administration. You will also study about the importance of reminding the patient for the forgotten dose of medicine and keeping the record of the dosage schedule.

Relevant Knowledge

A drug is any substance that alters physiological function, with the potential for affecting health. Medicine may be defined as a substance used to promote health, to prevent illness, to diagnose, to alleviate or cure disease. A medication is a substance used in the diagnosis, treatment, relief or prevention of health alterations. A drug is a chemical substance that modifies body function when taken into the living organism which may or may not have a therapeutic effect. A medication is a drug administered for its therapeutic effect. Thus, all medications are drugs, but not all drugs are medications.

Medicine Groups (Classifications)

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:

- Nonsteroidal 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. You will learn about some common groups later in this class.

The Seven “Rights”

When helping a person you must check and double check that you are dealing with

1. The right medicine
2. The right patient
3. The right time
4. The right dose
5. The right route
6. The right form
7. The right documentation

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. Do not help. Report this to your supervisor/doctor. If a patient takes the wrong medicine, it must be reported to the Doctor immediately.

The Right Patient

You must check the identity of the person before you help them with the medicines.

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 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 a duration of at least 4 hours between doses.

The Right Dose

Check and double check the dose. 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.

Refused Medicines

A person has the right to refuse a medicine. This refusal must be reported and documented.

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 & Record Keeping

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 a 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.

Exercise

1. Visit a nearby hospital and observe the medication chart of the patient i.e. the Doctor Order Sheet. Fill the table given below with the components identified in the medication chart of the patient:

Components to be observed	Component present in the Medication Chart

Assessment

A. Short Answer Questions:

1. What is drug administration?

2. Classify medicine groups

3. What are the seven rights in drug administration?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Drug and medicine
- 2. Refused medicine and forgotten medicine

Part B

Discussed in class the following:

- 1. Role of General Duty Assistant in drug administration
- 2. Seven rights in drug administration
- 3. Medicine groups

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Classify the medicines		
Demonstrated the knowledge of seven rights for assisting in the drug administration		
Demonstrate the knowledge of maintaining medication record of the patient		

Session 2: Forms and Routes of Medication

In this session, you will learn about the common forms of medicines and routes followed for the administration of the same.

Relevant Knowledge

Medicines are made in many forms and for many routes. Some medicines come in more than one form. Some can be given with more than one route. Complete medicine orders must state the route and the form that the patient must take.

Forms

Medicines can come in these forms:

- Tablets
- Capsules (regular and sustained release)
- Elixirs
- Suppositories (vaginal and rectal)
- Oral suspensions
- Syrups
- Tinctures
- Ointments
- Pastes
- Creams
- Drops (eye)
- IV suspensions and solutions
- Metered dose inhalers

Routes

Routes can be:

- Oral

- Buccal (inside cheek)
- Sublingual (under the tongue)
- Topical (on the skin)
- Ophthalmic (eye)
- Otic (ear)
- Vaginal
- Rectal
- Nasal
- Via a nasogastric or gastrostomy tube
- Inhalation
- Subcutaneous (under skin)
- Intramuscular (in the muscle)
- Intradermal (in the skin)
- Transdermal (through the skin)
- Intravenous (into the vein)

Complete Orders

A doctor or another person, like a nurse, must write a complete and legible order for a medicine before it is given or taken. 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.

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 upset the 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 a liquid form of medicine can also help people who have trouble with pills and capsules.

Age Specific Route and Form Considerations

Infants

- Use a syringe, dropper or nipple for oral liquid medicines.

Toddler

- Use a spoon or a 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 DOSAGES, routes and forms of medicines are usually now allowed.

Medicine Routes

A General Duty Assistant must be able to observe the patient or resident for the correct self-administration procedure. Below are routes that GDA can assist with nurse. The following are the common route of drug administration

(i) 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. Put on gloves. (Both the UAP and the patient).
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.

(ii) Transdermal

1. Remove the old patch if there is one.
2. Wash the area with soap and water.

3. Find a place that has no hair on the person's upper arm or their chest.
4. Dry the site.
5. Put on gloves (Both the UAP and the patient)
6. Put the dose on the patch or strip. Do not let it touch your own skin.
7. 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.
8. Cover with a plastic wrap or special dressing and tape it in place so that it does not fall off.
9. Write the date, time and your initials on the cover.

(iii) Oral

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

(iv) 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 cheek (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.

(v) Ophthalmic (Eye)

1. Put on gloves. (Both the UAP and the patient).
2. Help the person to a sitting position or into a supine position.
3. Have the patient tilt their head back.
4. Have the patient look up and away.
5. Have the person steady their hand against their forehead with the dropper in their other hand.

6. Pull down the lower lid.
7. Put the number of drops into the space under the lower eye lid.
8. Pull down the lower lid for an eye ointment.
9. Tell the person to squeeze the tube so that the medicine is placed on the inside of the lower eye lid, from the inside near the nose to the outer part of the inside of the lid. Do not touch the eye with the tip of the tube.
- 10 Ask the person to now close their eyes. Blinking will spread the drops and rolling the closed eyes will spread the ointment over the eye.
- 11 Clean the excess off with a tissue.

(vi) Otic (Ear)

1. Warm the ear drops to body temperature.
2. Tell the person to lie on their side so that the ear to get the medicine is up.
3. Straighten out the ear canal by pulling the ear lobe up and back.
4. 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.
5. Have the person keep their head to the side for at least 10 minutes.

(vii) Inhalation

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

(a) Metered-dose inhalers and

The steps for using a metered dose inhaler are:

1. Shake the bottle and remove the cap.
2. Ask the person to breathe out.
3. Have the person then place their lips around the mouthpiece.
4. Tell the person to press the bottle against the mouthpiece while the person is inhaling in long, deep and slow way.

5. Have the person hold their breath for a couple of seconds and then breathe out slowly.
6. Tell the person to rinse their mouth with water and then spit it out. This prevents an infection of the mouth.

(b) Turbo inhalers

The steps for using a turbo inhaler are:

1. Slide the sleeve away from the mouthpiece.
2. Turn the mouthpiece counter-clockwise in order to unscrew it.
3. Put the medicine into the stem of the mouthpiece.
4. Rescrew the inhaler.
5. Slide the sleeve all the way down to puncture the capsule.
6. Tell the person to tilt their head backwards.
7. Tell the person to blow out all the air in their lungs.
8. Tell the patient to then breathe in deeply and hold it for a couple of seconds while the mouthpiece is in their mouth.
9. Repeat steps 7 and 8 until all of the medicine has been used.
- 10 The patient can then rinse their mouth if they like.

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 Contraindications

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 kidney 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 very important 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
- Trouble breathing (dyspnea)
- Shortness of breath
- A drop in blood pressure
- Irregular heart rhythm
- Nausea
- Vomiting
- Abdominal cramping
- Loss of consciousness
- Death

Interactions

Medicines can interact with:

- Other medicines
- Some foods
- Some herbs
- Lifestyle (alcohol, etc)

Information about drug-drug, drug-food, drug-herb, drug-lifestyle interactions can be found in a drug reference book like the Physicians' Desk Reference (PDR) for every medicine.

Side Effects and Adverse Reactions

All medicines have side effects. Nausea and vomiting are the most common side effects. Some side effects are troublesome; others can be life threatening. Adverse drug reactions are serious and they can also lead to death.

Some medicines also have toxic effects. For example, tinnitus is a sign of toxicity with aspirin.

You must know about the side effects, adverse drug reactions and the toxic effects of all medicines

your patients are taking. 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.

The Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) has issued guidelines and rules for using abbreviations, acronyms and symbols.

Hospitals, nursing homes, assisted living facilities, and all other healthcare settings must now standardize abbreviations, acronyms and symbols that they are using. They must also make a list of all that they will not use.

Commonly used and acceptable abbreviations along with their full form meaning are as follows.

ABBREVIATION	MEANING
a.c.	Before meals
ad lib	Freely
a.m.	Morning
ASA	Aspirin
b.i.d	Twice a day
BM	Bowel movement
BP	Blood pressure
BS	Blood sugar
C (with line over it)	With
Cap	Capsule
Cc	Cubic centimeter
disc or D.C.	Discontinue
disp.	Dispense
elix.	Elixir
Ext	Extract
fl or fld	Fluid
g. or Gm. or g	Gram
Gr	Grain
gtt.	Drop
h. or hr.	Hour
MEq	Milliequivalent
Min	Minute

Mg	Milligram
ML	Milliliter
NPO	Nothing by mouth
NTG	Nitroglycerin
p.c.	After meals
p.m.	Evening
p.o.	By mouth
Prn	When needed
Q	Every
Qh	Every hour
Qid	Four times a day
s (with a line over it)	Without
SOB	Shortness of breath
Sol	Solution
ss.	One half
Stat	Immediately
susp.	Suspension
Syr.	Syrup
tab.	Tablet
Tbsp	Tablespoonful
Tid	Three times a day
Tinc	Tincture
Top	Topically
tr.	Tincture
tsp.	Teaspoon
ung.	Ointment
w/	With
w/o	Without

Exercise

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	

Assessment

- A. Short Answer Questions:

1. List different forms of medicine

2. List any three characteristics of complete order?

3. State the parameters indicated on the label of medicine

B. Fill in the blanks

- 1. _____ is a very severe allergic reaction that can happen if a person is allergic to a food
- 2. _____ and _____ are the most common side effects
- 3. _____ and _____ drug is used for both allergies as well as for sleep
- 4. Two types of inhalers that administer medicines _____ are and _____

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Use of oral and sublingual route of drug administration.
- 2. Metered-dose inhalers and turbo inhalers
- 3. Allergies and infection

Part B

Discussed in class the following:

- 1. Common factors responsible for allergic reaction
- 2. Forms and routes of medication

3. Complete orders of medication

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Identify the common forms and routes of drug administration		
Demonstrate the knowledge of contraindications and side effects of medicine .		

Session 3: Classification of Drugs

In this session you will learn about the classification, uses, contraindications and implications of using the drugs. You will also study about the medicines that fall under different drug groups. Drugs may be classified according to their chemical composition, clinical actions, therapeutic effect on body systems, their purpose and uses.

Relevant Knowledge

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 antiinflammatory drug. GDA should have thorough knowledge about the general characteristics of drugs in each class. Each class of drugs has implications for proper administration and monitoring.

Classification of Drugs

The following are the major categories of drugs:

1. Antacids

Uses: Gastritis, peptic ulcer, hiatal hernia and reflux esophagitis.

Adverse Reactions and Side Effects: Constipation, diarrhea, flatus, abdominal distention, alkaluria (urine that is not normal and has a high base pH).

Contraindications: Allergy and sensitivity

Implications: Check for stomach pain, GI symptoms and kidney problems.

Examples of Medicines in this Group:

- aluminum carbonate
- calcium carbonate

2. 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.

Adverse Reactions and Side Effects: Hemorrhage, diarrhea, fever, rash and blood disorders depending on the drug.

Contraindications: Bleeding disorders, (hemophilia and leukemia), ulcers, blood problems, nephritis

Implications: Observe for bleeding (like blood in the mouth, blood when the person shaves, black stools, stool occult blood, ecchymosis (black and blue marks), etc. Check the BP. It could be too high.

Examples of Medicines in this Group:

- warfarin sodium
- heparin

3. Anticonvulsants

Uses: They prevent seizures.

Adverse Reactions and Side Effects: Depressed bone marrow, which can be life-threatening, GI problems, confusion, lack of balance and slurring of speech.

Contraindications: Allergy

Implications: Observe liver and kidney function, blood, mental state, and for toxicity (ataxia, bone marrow depression, nausea, vomiting, cardiovascular problems, Stevens-Johnson syndrome)

Examples of Medicines in this Group:

- phenytoin
- diazepam

4. Antidepressants

Uses: Depression, Bed wetting for children.

Adverse Reactions and Side Effects: Orthostatic hypotension, mouth dryness, dizziness, drowsiness, urine retention, high blood pressure, kidney failure and paralytic ileus.

Contraindications: Large prostate, seizures, kidney, liver and heart disease.

Implications: Take the BP both standing and lying. Check the mental state. Observe for unusual facial symptoms and urine retention.

Examples of Medicines in this Group:

- sertraline
- amitriptyline

- bupropion
- phenelzine

5. Antidiabetic Medicines

Uses: Diabetes and ketoacidosis

Adverse Reactions and Side Effects: Hypoglycemia (low blood pressure) and liver damage.

Contraindications: Oral agents are contraindicated for juvenile diabetes and ketoacidosis.

Implications: Check the blood glucose and check for signs of high and low blood sugar.

Examples of Medicines in this Group:

- insulin
- glyburide

6. Antidiarrheals

Uses: Diarrhea

Adverse Reactions and Side Effects: Constipation, paralytic ileus, and stomach pain.
Contraindications: Colitis

Implications: Used for short term therapy (48 hours or less). Check the bowel response.

Examples of Medicines in this Group:

- bismuth subgallate
- kaolin and pectin mixtures

7. Antifungals

Uses: Fungus infections

Adverse Reactions and Side Effects: Kidney, liver damage, GI problems, hypokalemia (low potassium), anorexia (lack of appetite), nausea and vomiting.

Contraindications: Depressed bone marrow.

Implications: Check the vital signs, I & O, blood, weight, hearing, kidney and liver function.

Examples of Medicines in this Group:

- nystatin
- amphotericin B

8. Antihistamines

Uses: Allergies.

Adverse Reactions and Side Effects: Most can cause drowsiness, headache, urinary retention, blood problems, thick bronchial secretions and GI effects

Contraindications: Asthma, peptic ulcer, narrow angle glaucoma.

Implications: Check the urinary, respiratory and cardiac status.

Examples of Medicines in this Group:

- diphenhydramine hydrochloride
- chlorpheniramine maleate

9. Anti-Infectives

Uses: Infections

Adverse Reactions and Side Effects: Diarrhea, nausea, vomiting, bone marrow depression and anaphylaxis (life threatening)

Contraindications: Most people allergic to penicillin are also allergic to the cephalosporins.

Implications: Observe bowel pattern and urinary output. Check the kidney function, and for signs of another infection and bleeding.

Examples of Medicines in this Group:

- penicillin
- tetracycline

10. Antineoplastics

Uses: Cancer

Adverse Reactions and Side Effects: Nausea, vomiting, hair loss, liver damage, and heart damage.

Contraindications: Liver and kidney damage.

Implications: Check kidney and liver function, I & O. Observe for bleeding, jaundice (yellow skin and yellow eyes), dependent edema, and breaks in the skin.

Examples of Medicines in this Group:

- fluorouracil
- cisplatin

11. Antiparkinson Agents

Uses: Parkinson's disease

Adverse Reactions and Side Effects: Involuntary movement, insomnia, nausea, vomiting, orthostatic hypotension, dry mouth, numbness and headache

Contraindications: Narrow angle glaucoma

Implications: Check the respirations, blood pressure and changes in mental and behavioral states.

Examples of Medicines in this Group:

- levodopa
- entacapone

12. Antipsychotic and Neuroleptic Agents

Uses: Psychosis and anxiety. They are also sometimes used for unrelieved hiccups, nausea, vomiting, and pediatric behavior problems as well as relaxation before surgery.

Adverse Reactions and Side Effects: Some symptoms with antiparkinsonian medicines. Some side effects include dry mouth, photosensitivity (sensitive to light), hypotension (low blood pressure) and life threatening cardiac problems and breathing problems (laryngospasm).

Contraindications: Heart disease, high blood pressure, severe bone marrow

depression, blood disorders, Parkinson's disease, narrow angle glaucoma and children less than 12 years of age. Cautions use with the elderly.

Implications: Check the I & O, blood pressure lying and standing (orthostatic hypotension), EPS (antiparkinsonian agents should be used for this). Observe for dizziness, palpitations, tachycardia (fast heart rate), changes in emotion, level of consciousness, as well as for any walking and sleep problems.

Examples of Medicines in this Group:

- haloperidol
- chlorpromazine

13. Antitubercular Medicines

Uses: Tuberculosis

Adverse Reactions and Side Effects: Anorexia, nausea, vomiting, rash, kidney, liver and hearing effects, which could be severe.

Contraindications: Kidney disease. Caution with liver disease, pregnancy and lactation

Implications: Check kidney and liver status and for signs of anemia.

Examples of Medicines in this Group:

- isoniazid
- rifambutin

14. Cough Medicines & Expectorants

Uses: The expectorants are used for a cough from bronchitis, TB, pneumonia, cystic fibrosis and COPD. Antitussives are used for coughs that are not producing mucus.

Adverse Reactions and Side Effects: Dizziness, drowsiness and nausea

Contraindications: Iodine sensitivity, pregnancy, lactation and an over active thyroid. Caution with the old people and those with asthma

Implications: Check the cough and the sputum. Increase fluid intake and humidity to keep the mucus thin.

Examples of Medicines in this Group:

- guaifenesin

- codeine

15. Antivirals

Uses: Infections caused by a virus like HIV, herpes and varicella.

Adverse Reactions and Side Effects: Nausea, vomiting, diarrhea, headache, lack of appetite, blood problems, and kidney failure

Contraindications: People with an abnormal immune system, like AIDS, and those with herpes. Caution with pregnancy, lactation, kidney and liver disease and dehydration

Implications: Check for kidney and liver problems. Observe for signs of infection and allergic reactions (itching, rash).

Examples of Medicines in this Group:

- acyclovir sodium

- cidofovir

16. Barbiturates

Uses: Epilepsy, sedation, insomnia, anesthesia, and gall stones

Adverse Reactions and Side Effects: Drowsiness, nausea, blood problems and StevensJohnson syndrome

Contraindications: Allergy, poor liver function and pregnancy. Caution with the elderly and those that have kidney or liver disease

Implications: Observe seizure control and for signs of toxicity (insomnia, hallucinations, hypotension, pulmonary constriction; cold, clammy skin; blue or gray lips, vomiting, delirium, weakness)

Examples of Medicines in this Group:

- phenobarbital

- secobarbital

17. Benzodiazepines

Uses: Anxiety, acute alcohol withdrawal and pre-operative relaxation.

Adverse Reactions and Side Effects: Physical dependence and abuse, dizziness, drowsiness, orthostatic hypotension, and blurred vision

Contraindications: Narrow angle glaucoma, infants less than 6 months old. Caution with the elderly as well as with those that have kidney and/or liver disease

Implications: Check the lying and standing blood pressure (report it if it drops 20 mm Hg or more), pulse, liver and kidney function and signs of dependency. Give the person milk or food to prevent GI symptoms.

Examples of Medicines in this Group:

- diazepam
- clonazepam

18. Bronchodilators

Uses: Asthma, spasm of the bronchi, COPD, and Cheyne-Stokes respirations

Adverse Reactions and Side Effects: Dyspnea (trouble breathing), bronchospasm, anxiety, tremors, throat irritation, nausea and vomiting.

Contraindications: Narrow angle glaucoma, severe heart disease, and a fast heart rate. Cautious use with hypertension, seizures, pregnancy and lactation, an over active thyroid and a large prostate

Implications: Check for response (absence of dyspnea and/or wheezing)

Examples of Medicines in this Group:

- albuterol
- aminophylline

19. Diuretics

Uses: High blood pressure (hypertension) and edema

Adverse Reactions and Side Effects: Low potassium (hypokalemia), high blood glucose (hyperglycemia) blood problems, like anemia, and dehydration

Contraindications: Electrolyte imbalances, poor urine output and dehydration. Caution among the elderly as well as when the person has a kidney or liver disease

Implications: Potassium in the form of a tablet or liquid may be needed. A banana also gives the person potassium, Check the lying and standing blood pressures. This medicine should be given in the morning so that the person does not have to get up in the middle of the night to void.

Examples of Medicines in this Group:

- furosemide
- hydrochlorothiazide

20. Histamine H2 Antagonists

Uses: Ulcers and GI reflux disease

Adverse Reactions and Side Effects: Blood problems, diarrhea and headache.

Contraindications: Cautious use with children less than 16 years of age, and with those people that have liver or kidney disease, and organic brain syndrome. Caution is also indicated during pregnancy and if the person is breast feeding a baby.

Implications: Check the I & O. Give it to the person during their meal so that it will take its full effect.

Examples of Medicines in this Group:

- cimetidine
- ranitidine

21. Immunosuppressants

Uses: Prevention of organ transplant rejection

Adverse Reactions and Side Effects: Protein, blood and albumin in the urine, Kidney failure, liver damage, oral thrush, sore gums, fever and headache.

Contraindications: Caution with severe liver or kidney disease and pregnancy

Implications: Check for liver and kidney function. Signs of liver damage are itching, light colored stools, jaundice and dark urine. Give the person this medicine with a meal.

Examples of Medicines in this Group:

- cyclosporine
- azathioprine

22. Laxatives

Uses: Constipation, as bowel prep and a stool softener

Adverse Reactions and Side Effects: Cramping, diarrhea, and nausea

Contraindications: Large colon, stomach pain, nausea, vomiting, impaction, GI obstruction, gastric

retention and colitis. Caution must be used if the person has hemorrhoids and/or rectal bleeding

Implications: Check the I & O. The person must take this with water only. The person should not take it within one hour after taking milk, a meal or an antacid.

Examples of Medicines in this Group:

- psyllium
- docusate sodium

23. Nonsteroidal Anti-Inflammatories

Uses: Mild to moderate pain, arthritis and dysmenorrhea

Adverse Reactions and Side Effects: Blood problems, kidney problems, blood in the urine, painful urination, stomach pain, lack of appetite, anorexia, dizziness and drowsiness.

Contraindications: Asthma, severe liver and/or kidney disease. Cautions use with the elderly, children, lactation, pregnancy and for patients with GI, cardiac and/or bleeding problems.

Implications: Check the blood, kidney and liver function. Baseline hearing and eye exams are recommended so that changes can be seen. Toxicity can lead to tinnitus (ringing in the ears) and/or blurred vision.

Examples of Medicines in this Group:

- ibuprofen
- naproxen

24. Opioid Analgesics

Uses: Moderate to severe pain

Adverse Reactions and Side Effects: GI problems (constipation, nausea, vomiting, anorexia, cramps), sedation, slow breathing, circulatory depression and increased pressure in the head

Contraindications: Upper airway obstruction, bronchial asthma, and addiction. Cautious use with kidney, liver, respiratory and heart disease.

Implications: Check the respiratory, urinary and mental status, including the person's level of consciousness. An antiemetic can be used for nausea and vomiting. Continue to check the level of pain

Examples of Medicines in this Group:

- Codeine

25. Salicylates

Uses: Mild to moderate pain, inflammation (arthritis), and for a fever

Adverse Reactions and Side Effects: Rash, GI symptoms, liver and blood problems, and hearing problems (tinnitus- a sign of possible toxicity)

Contraindications: Frequently occurring contraindicated with a vitamin K deficiency, GI bleeding, a bleeding disorder, and children with Reye's syndrome. Caution with Hodgkin's disease, liver and kidney failure, anemia

Implications: Look for signs of a liver problem (clay colored stool, dark urine, diarrhea, yellow sclera and skin, itching, fever, abdominal pain) and ototoxicity (ringing or roaring in the ears, tinnitus)

Examples of Medicines in this Group:

- aspirin
- salsalate

26. Thyroid Medicines

Uses: Under active thyroid gland

Adverse Reactions and Side Effects: Palpitations, tachycardia, insomnia, tremors, angina, weight loss, irregular heartbeat, and thyroid storm.

Contraindications: Heart attack, and poor adrenal function. Cautious use with the elderly, pregnant and breast feeding women, and for patients with diabetes, high blood pressure, angina, and other heart disease

Implications: The person should take it at the same time every day. Check the blood pressure before each dose. Check the I & O, weight, and for irritability and nervousness

Examples of Medicines in this Group:

- thyroid

- levothyroxin

Exercise

1. Visit a nearby hospital and fill the table given below with the examples of particular drug category:

Drug Category	Uses	Contraindications	Implications	Examples of
Anticonvulsant				
Bronchodilators				
Immunosuppressants				
Diuretics				
Salicylates				

Assessment

- A. Short Answer Questions:

1. What is Antacid?

2. What is the use of laxatives?

3. What are the common side effects of anti-depressant?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Use of anti-fungal and anit-viral drugs
- 2. Cough syrup and bronchodilators
- 3. Anti virals and anti infective agents
- 4. Anti histamines and histamine H2 antagonists drugs
- 5. Anticonvulsants and antidepressants

Part B

Discussed in class the following:

- 1. Classification of drugs
- 2. Uses of drugs
- 3. Contraindications of drugs
- 4. Implications of using drugs
- 5. Examples of medicines fall under the drug category

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Identify the drugs of different categories		
Demonstrate the knowledge of use of drug for particular indication		
Identify the medicines fall under a specific drug category		

Session 4: Drugs of Cardiovascular System

In this session, you will learn about different categories, uses, contraindications and implications of drugs used in treatment of cardiovascular system.

Relevant Knowledge

1. Alpha-Adrenergic Blockers

Uses: Hypertension (high blood pressure)

Adverse Reactions and Side Effects: Hypotension (low blood pressure), a stuffed nose, tachycardia (fast heart rate over 100), diarrhea, nausea, and vomiting.

Contraindications: Myocardial infarction (MI) and coronary artery disease, including angina (chest pain).

Implications: Check daily weights, I&O, and the blood pressure (BP) standing and lying.

Examples of Medicines in this Group:

- dihydroergotamine mesylate
- phentolamine mesylate

2. Beta-Adrenergic Blockers

Uses: High blood pressure, angina and irregular heartbeats coming from the heart's ventricles.

Adverse Reactions and Side Effects: Orthostatic hypotension, diarrhea, nausea, vomiting, slow heart rate, blood problems, congestive heart failure (CHF) and spasms in the bronchus.

Contraindications: Heart block, shock and CHF. Cautions use with the elderly and those patients with COPD, coronary artery disease, asthma, kidney disease, thyroid disease, and pregnancy.

Implications: Check the blood pressure, I&O, daily weights, and pulse. Observe for edema and take the apical and radial pulse.

Examples of Medicines in this Group:

- metoprolol
- propranolol

3. Antiangina Medicines

Uses: Angina, hypertension (high blood pressure) and irregular heartbeats.

Adverse Reactions and Side Effects: Postural hypotension, fatigue, irregular heartbeats, headache, edema, dizziness.

Contraindications: Increased pressure in the brain and a bleed in the brain.

Implications: Observe for side effects and orthostatic hypotension. Check for angina (chest) pain.

Examples of Medicines in this Group:

- propranolol
- verapamil hydrochloride
- nitroglycerine

4. Anticholinergics

Uses: Some slow down the GI, urinary and gallbladder movement. Others lower GI secretions, decrease involuntary movement, and relieve nausea, and vomiting.

Adverse Reactions and Side Effects: Dryness of the mouth, paralytic ileus, constipation, urinary problems (retention and hesitancy) dizziness and headache.

Contraindications: GI or urinary obstruction, narrow-angle glaucoma, and myasthenia gravis.

Implications: Observe urine and bowel function as well as vital signs.

Examples of Medicines in this Group:

- atropine sulfate
- scopolamine

5. Antidysrhythmias

Uses: Fast heart rate, irregular heartbeat, high blood pressure and angina.

Adverse Reactions and Side Effects: Low blood pressure, a pulse less than 60 (bradycardia) and irregular heartbeats.

Contraindications: Various. Check each medicine.

Implications: Check the rate and rhythm of the pulse. Check the blood pressure, and I & O. Look for swelling (edema).

Examples of Medicines in this Group:

- digoxin
- quinidine

6. Antihypertensives

Uses: Hypertension (high blood pressure), heart failure, angina and some irregular heart beats.

Adverse Reactions and Side Effects: Hypotension (high blood pressure), tachycardia (fast pulse), bradycardia (slow pulse), nausea, vomiting and headache.

Contraindications: Heartblock

Implications: Check for edema of the feet and legs, check kidney function, blood pressure and breathing.

Examples of Medicines in this Group:

- captopril
- propranolol hydrochloride

7. Calcium Channel Blockers

Uses: Angina, high blood pressure and irregular heartbeats.

Adverse Reactions and Side Effects: Irregular heartbeats, edema, fatigue, headache, and drowsiness.

Contraindications: Systolic blood pressure of less than 90 mm HG, Wolff-Parkinson-White syndrome, heart block, and cardiogenic shock. CHF may get worse in the presence of edema. Cautions use with liver and kidney disease.

Implications: Check the blood pressure, pulse and respirations. Administer at bedtime and before meals.

Examples of Medicines in this Group:

- verapamil
- felodipine

8. Cardiac Glycosides

Uses: CHF and rapid heart rate

Adverse Reactions and Side Effects: Cardiac changes, hypotension, GI problems, blurred vision, yellowish-green halos and headache.

Contraindications: Some irregular heartbeats, current heart attack, severe respiratory problems, and a rapid heartbeat. Caution with people that do NOT have the right amount of potassium, magnesium and/or calcium, kidney or liver disease, an under active thyroid and the elderly.

Implications: Check vital signs, check the apical heart rate for one full minute before giving it to the person to take (if less than 60, hold the dose and notify the MD). Check the I & O.

Examples of Medicines in this Group:

- digitoxin
- digoxin

9. Cholinergics

Uses: Myasthenia gravis, bladder distention, and a paralytic ileus

Adverse Reactions and Side Effects: Spasms of the bronchi and larynx, slow breathing, a convulsion, paralysis, respiratory arrest, nausea, vomiting and diarrhea

Contraindications: Kidney or intestinal obstruction. Cautious use with children, lactation, slow pulse, low blood pressure, seizures, asthma and an over active thyroid

Implications: Check the vital signs, I & O. Check for urine retention, bradycardia (slow pulse), spasms of the bronchi, low blood pressure and slowing of the person's breathing.

Examples of Medicines in this Group:

- neostigmine
- bethanechol

10. Cholinergic Blockers

Uses: To control secretions during surgery, and to slow down the urinary, biliary and GI tracts. Some are used for Parkinson like symptoms that result from the use of a neuroleptic medicine

Adverse Reactions and Side Effects: Constipation and dryness of the mouth.

Contraindications: GI or urinary obstruction, angle closure glaucoma, and myasthenia gravis. Cautious use with the elderly and with patients who have an enlarged prostate or a rapid heart rate.

Implications: Check the urinary status and I & O. Check for any dysuria (pain while urinating), frequency or retention. The medicine may be discontinued with these signs. Observe mental status and for constipation. Administer oral doses with milk or food

Examples of Medicines in this Group:

- atropine
- scopolamine

11. Corticosteroids

Uses: Some stop inflammation. Others are used for allergies, adrenal gland problems and brain swelling (edema)

Adverse Reactions and Side Effects: Insomnia, changes in behavior, an elevated mood (euphoria), an ulcer, GI irritation, sodium and fluid retention, hypokalemia (low potassium), hyperglycemia (high blood glucose), and a lack of tolerance for carbohydrates

Contraindications: Fungus infections, amebiasis, and lactation. Caution with the elderly, children and pregnant women, as well as those with diabetes, seizures, ulcers, glaucoma, CHF, hypertension, poor kidney function, myasthenia gravis and ulcerative colitis

Implications: Give the person milk or food with the medicine to prevent GI upset. Check the blood sugar, weight, I & O, and for any signs of infection. Observe for mood changes, like depression.

Examples of Medicines in this Group:

- cortisone
- hydrocortisone

12. Vasodilators

Uses: High blood pressure and angina.

Adverse Reactions and Side Effects: Hypotension (low blood pressure), hypertension (high blood pressure), ECG changes, nausea, headache

Contraindications: Tachycardia (rapid heart rate) and acute MI. Cautious use with ulcers and some heart disease

Implications: They should be taken with meals to prevent any GI problems.

Examples of Medicines in This Group:

- amyl nitrate
- hydralazine

Exercise

1. Visit a nearby hospital and observe the drugs used to decrease and increase the blood pressure. Write the name of the drugs in the table given below which increases and decreases the blood pressure:

Drug that increase the blood pressure	Drug that decrease the blood pressure

2. Visit a nearby hospital and fill the table given below with the example of particular drug category:

Drug Category	Uses	Contraindications	Implications	Examples of
Beta-Adrenergic				
Blockers				
Antidysrhythmias				
Cardiac Glycosides				
Medicines				

Assessment

A. Short Answer Questions:

1. What is Vasodilators?

2. What is Cholinergic Blockers?

3. Enlist the drugs used for disrhythmia?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

1. Use of cholinergic and cholinergic blocker
2. Use of Alfa adrenergic and Beta adrenergic drugs
3. Calcium channel blockers and sodium channel blockers

Part B

Discussed in class the following:

1. Role of General Duty Assistant in monitoring of heart during administration of cardiovascular drug
2. Categorization of drugs in treatment of cardiovascular system

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Demonstrate the knowledge of use, contraindication and implications of cardiovascular drugs		
Identify the medicines that fall under the cardiovascular drug category		

Session 5: Storage and Administration of Medicine

In this session, you will learn about disposing and preventing the medicines. You will also study about the special measures to prevent the medical errors and infection control during drug administration.

Relevant Knowledge

All medicines must be secure at all times. This gives safety to children, confused people, and those at risk for taking medications that are not theirs. Some medicines must be kept out of light. Others have to be put in the refrigerator. Others have to be kept at room temperature. Read the label to make sure that you return the medicine bottle to the right place.

Disposing Medicines

These medicines must be thrown out:

- Those that have expired
- Those that are in a bottle without a label
- Those that are in a bottle with a label that you cannot read
- Those that have been stopped or discontinued by the Doctor

Medicine should be thrown away in the sink under running water. They should not be thrown away in the trash can, The GDA must document all medicine(s) that are thrown away.

Preventing Mistakes and Errors

Patient identification is Vital. Many mistakes happen when the person is not identified properly. When you help with medicine, you must use at least two ways of identifying the person. A bed or room number cannot be one of these. Some examples of two identifiers include the person's:

- First, middle and last name;
- A code number given to that person;
- Social security number;
- Birthday in terms of month, day and year;
- Photograph;
- A bar code containing two or more unique identifiers.

Do NOT help with medicines if you cannot identify the person. Tell your supervisor.

Special Measures to Prevent Medical Errors among Populations at Risk

Other things that you should do to prevent medical errors for people at high risk for errors are as follows:

Decreased level of consciousness

Patients that are not fully alert, awake and oriented to time, place and person are at high risk for errors. Patient identification is necessary when you are helping a person who is not fully awake and alert. At times, a family member or friend can help you with this process. They can also ask questions about the medicines the person will be taking. All of these things will help to avoid a mistake with this high-risk group.

Cognitive impairments

People that are confused or not oriented are at risk for mistakes. Again, patient identification is very important. Many elderly can be a little confused at some times of the day. For example, they may be a little confused when they wake up or when the sun goes down later in the day.

It is very helpful, depending on the person's level of cognition, to talk with the person in a way that they can understand. Also, listen to them, especially if they alert you to the fact that a medicine is not theirs. Pictures and drawings may help you to communicate with a person that is confused. Again, do not help with medicine if the person is not able to take them. Tell your supervisor.

Language barriers

Our best defense against mistakes is an awake, alert, oriented, mentally sound person who knows about all of their medicines. These "ideal" people are not seen very often. Our patients very often have problems, including a language barrier. We care for people that have come from all over the world.

They may not know how to speak English.

A person may be mentally challenged just like a person who is confused. He/she may not understand what you are saying or asking. You may also not understand what he/she are trying to tell you.

Interpreters, family or friends, pictures and drawings can help us with these people. Also, it is always wise to learn some basic foreign language phrases words when you work with a special group of people, like those who have come from other country.

Sensory disorders

Hearing and vision problems can also lead to errors. A patient that is blind will not be able to see if

they are getting the wrong medicine. People with a hearing problem may not hear you when you tell them what medicine you are handing to them. Things like eyeglasses and hearing aids must be given to the person in order to ensure their safety. Also, the use of large print or Braille reading materials and magnifying glasses may be helpful to the person who is not able to see well. Speaking loudly while facing the patient with a hearing problem may help to prevent a mistake.

Infants and children

Infants and children are not able to know about their medicines and their treatments. They are not able to ask questions. They cannot tell you if they have a concern about a wrong medicine. They are not even able to tell you their name or their date of birth until they get to a certain age. The GDA should follow the rules and guidelines for handling infants and children.

Developmental delays

The same things you just learned above for infants and children should be done with these people, as specific to the degree of this delay.

Mental problems

Lastly, people with a mental problem are also at risk. They may take medicines that make them sleepy. They may not be able to tell you their name. They may not know about the medicines they take. They may not be able to take their medicines in the right way.

Infection Control during Drug Administration

Standard precautions in healthcare greatly lower the risk of exposures to HIV and other blood borne pathogens. Other infection control measures that help to prevent the spread of infection are:

- handwashing;
- engineering controls, such as “needleless” systems;
- work practice controls;
- the use of personal protective equipment, such as gowns, goggles, gloves and masks; and
- the proper handling of sharps and regulated biohazardous waste.

The following routine infection control measures must be taken when helping a person with their medicine

- ALWAYS wash your hands before and after each patient contact.

- Wear gloves whenever you may have contact with blood and other bodily fluids, as well as when touching skin that is not intact. Wash your hands before you put on gloves and wash your hands after you take them off. Gloves are not a substitute for handwashing.
- Wear a waterproof gown, goggles and a surgical mask if you may come in contact with bodily fluids, splashes and spills.

Medical and Surgical Asepsis

The following routes are considered clean and, therefore, medical asepsis must be adhered to.

- oral
- buccal
- sublingual
- topical
- vaginal
- rectal
- nasal
- inhalation

Exercise

1. Visit a nearby hospital and fill the following table based on your observation:

Category of Medicine/Drug	Storage Method	Disposal Method
Tablets		
Cottons		
Injections		
Syrups		
Ointments		
Powders		
DNS		

Assessment

A. Short Answer Questions:

1. What are the techniques adopted for disposing medicines?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Role of consciousness and cognitive impairment in medical error
- 2. Role of language barrier and sensory disorder in medical error
- 3. Medical and surgical asepsis

Part B

Discussed in class the following:

- 1. Role of GDA in preventing medical error
- 2. Role of GDA in storing and disposing medicines

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Demonstrate the knowledge of safe disposal of medicine		
Identify the medical errors in drug administration		
Adopt strategies in prevention of infection in drug administration		

Notes

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Sector: **Healthcare**

NSQF Level 3; Class XI
HSS306 - NQ2014
Physiotherapy

Student Workbook

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Session 1: Basic Principles of Physiotherapy

In this session, you will learn about the principles of physiotherapy and treatment of various conditions and injuries through physiotherapy. You will also study various approaches and techniques of physiotherapy that is employed to help a person overcome the injury, problems and disability.

Relevant Knowledge

Physiotherapy, often referred to as “ physio” uses physical methods, such as massage and manipulation, to promote healing and wellbeing. Physiotherapy treatments are often used to help restore a person’s range of movement after injury or illness. Physiotherapists are healthcare professionals who are trained specifically in physiotherapy. They work in a number of different places, including hospitals, and community health centres. Physiotherapist frequently treats problems that affect muscles, joints, heart, blood circulation and lungs. Physiotherapy also help people with mental health conditions, neurological conditions (those affecting the brain and nervous system) and chronic (long-term) health conditions.

Principles

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

The aim of physiotherapy is to help restore normal body function, as well as treating a specific injury or illness. The physiotherapist may consider ways to improve patient’s general wellbeing and overall quality of life.

Physiotherapy usually take a holistic approach, which means it looks at the body as a whole, rather than focusing on individual factors of an injury or illness. For example, back pain can have a number of causes, such as muscle tension, overstretching, bending awkwardly, standing or bending for long periods, lifting or carrying incorrectly.

Patient education is an important part of physiotherapy. A physiotherapist can also advise patient about how to manage patient’s condition more effectively, for example by exercising regularly.

Indication of Physiotherapy

Physiotherapy can help people of all ages and social backgrounds. Almost all people who have an injury or a physical disability can benefit from physiotherapy, including children and elderly people.

In particular, physiotherapy can help rehabilitate (restore to health) people who have had a stroke, when the blood supply to part of the brain is cut off, heart problems and breathing difficulties, sports injury, recently had surgery that affects their movement

or mobility, etc. Physiotherapist also use their knowledge and skills to help people overcome bone and joint conditions.

Bone and Joint Conditions

Physiotherapy focuses on the treatment of conditions and injuries that affect the bones and joints. In particular, Physiotherapy often helps patients who are recovering from orthopaedic surgery (surgery to correct damage or deformities of the bones or joints).

The physiotherapist may devise a programme that includes the use of strength training and exercises to help improve co-ordination and balance. They may also use electrical stimulation (using small electrical impulses to stimulate the nerves and muscles).

Heart and Lung Conditions

Physiotherapy may treat people who have:

- Had a heart attack
- Chronic obstructive pulmonary disease (copd), a collection of lung conditions including chronic bronchitis, emphysema and chronic obstructive airways disease
- Cystic fibrosis

Neurological Conditions

Physiotherapy can help people with conditions that affect the brain and nervous system, as well as affect a person's co-ordination, neurological conditions which can sometimes cause paralysis (an inability to move) and muscle pain:

- Stroke: a serious condition where the blood supply to part of the brain is cut off
- Multiple sclerosis: a condition that affects the central nervous system, which controls functions of the body such as movement and balance
- Parkinson's disease: a chronic (long-term) condition that affects the way the brain co-ordinates the body's movements
- Cerebral palsy: a condition where brain damage affects a child's movement and co-ordination
- Spina bifida: a brain condition that causes a deformity of the spine

Childhood Conditions

Physiotherapy treats children with musculoskeletal conditions (which affect the bones and muscles). For example, muscular dystrophy is a congenital condition (present

from birth) where a person's muscles gradually become weaker over time, leading to a loss of strength and mobility.

In such cases, a physiotherapist may be able to use a treatment programme that will help the person maintain muscle strength, increase flexibility and prevent stiffening of the joints.

Conditions that occur in Old Age

Physiotherapy often treat conditions that are common in old age, such as the following:

- Arthritis, which causes pain and swelling (inflammation) of the joints
- Osteoporosis, where the bones become thin and brittle

Physiotherapy may help patients who are recovering from hip replacement surgery.

Physiotherapy also plays an important role in the general care and wellbeing of elderly people by improving their overall health and fitness to help them stay active and independent.

Physiotherapy Techniques

By using a number of different approaches and techniques, a physiotherapist can help a person overcome injury or short-term health problems, or manage long-term disability. Physiotherapy techniques and approaches can improve a person's ability to use parts of their body that are affected by a health condition or injury. Physiotherapy uses a wide range of techniques and approaches, including massage, manipulation, exercise, energy based therapy and hydrotherapy.

(i) Massage and Manipulation

Massage involves manipulating the body's soft tissues using the hands. It is suitable for most people and can be used to:

- Improve circulation (the flow of blood around the body)
- Help fluid drain from parts of the body more efficiently
- Improve movement of different parts of the body
- Relieve pain and help patient relax

Conditions that are often treated using massage include neck problems, headaches and stress.

(ii) Movement and Exercise

Physiotherapy often uses an exercise programme, which may incorporate specific exercises to help with particular health problems. For example, gentle exercise, such as walking or swimming, may be recommended for someone who is recovering from an illness or injury that affects their overall mobility. For someone who is having problems moving a limb due to a health condition, such as a stroke, a physiotherapist may suggest specific exercises that target the affected area of the body.

These types of exercises are designed to strengthen patient's body and improve patient's range of movement. 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.

(iii) Energy Based Therapy

Energy based therapy, which is sometimes referred to as electrotherapy, is a form of treatment that uses different types of energy, such as electric currents or impulses (small electric shocks) to stimulate the nervous system. The electric impulses make patient's muscles contract (tighten), which can help ease pain and promote healing.

Energy based therapies do not hurt, although with some types, such as TENS, patient may feel a slight tingling sensation just below the surface of patient's skin. Energy based therapies include:

- **TENS** - a transcutaneous electrical nerve stimulation (TENS) machine delivers an electric current to stop patient's nerves sending pain signals to patient's brain and encourages endorphins (natural painkilling hormones) to be released.
- **Ultrasound** - high-frequency sound waves treat deep tissue injuries by stimulating blood circulation and cell activity. It is thought to help reduce pain and muscle spasm and speed up the healing process.
- **Laser therapy** - lasers (narrow beams of light) help reduce pain and muscle spasms. Laser therapy is thought to be most effective at treating tendon conditions, although studies have shown that it may not be as effective as other types of energy based therapies.
- **Shortwave diathermy** - an electromagnetic field generates heat within patient's body's tissues This is thought to help reduce inflammation (swelling), strengthen tissues and reduce pain.

(iv) Hydrotherapy

Hydrotherapy is a form of physiotherapy that is carried out in water, usually a warm, shallow swimming pool or a special hydrotherapy bath. The resistance (weight) of the water pushes against patient's body as patient perform exercises while patient are floating. This helps improve patient's circulation (blood flow), relieves pain and relaxes patient's muscles.

Exercise

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	

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	

Assessment

- A. Short Answer Questions:

1. What is physiotherapy?

2. State the basic principles of physiotherapy

3. Explain energy based therapy

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Laser and short wave energy based technique.
- 2. Rehabilitation centre and physiotherapy centre.
- 3. Arthritis and osteoporosis

Part B

Discussed in class the following:

- 1. Benefits of physiotherapy in healing injury
- 2. Physiotherapy techniques

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Demonstrate the knowledge of different techniques of physiotherapy		

Session 2: Body Mechanics

In this session, you will learn about the principles and techniques of good body mechanics. You will also study the general consideration for performing physical task, reasons for the use of proper body mechanics and steps involved in properly moving an object to a new location.

Relevant Knowledge

Some of the most common injuries sustained by members of the health care team are severe musculoskeletal strains. Many injuries can be avoided by the conscious use of proper body mechanics when performing physical.

Definition

Body mechanics is the utilization of correct muscles to complete a task safely and efficiently, without undue strain on any muscle or joint.

Principles of Good Body Mechanics

Maintain a Stable Center of Gravity.

1. Keep your center of gravity low.
2. Keep your back straight.
3. Bend at the knees and hips.

Maintain a “Wide Base of Support”. This will provide patient with maximum stability while lifting.

1. Keep your feet apart.
2. Place one foot slightly ahead of the other.
3. Flex your knees to absorb jolts.
4. Turn with your feet.

Maintain the “Line of Gravity”. The line should pass vertically through the base of support.

1. Keep your back straight.
2. Keep the objects being lifted close to your body.

Maintain “Proper Body Alignment”.

1. Tuck in your buttocks.
2. Pull your abdomen in and up.
3. Keep your back flat.
4. Keep your head up.
5. Keep your chin in.
6. Keep your weight forward and supported on the outside of your feet.

Techniques of Body Mechanics

Lifting

1. Use the stronger leg muscles for lifting.
2. Bend at the knees and hips; keep your back straight.
3. Lift straight upward, in one smooth motion.

Reaching

1. Stand directly in front of and close to the object.
2. Avoid twisting or stretching.
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, be sure that it is not too large or too heavy.

Pivoting

1. Place one foot slightly ahead of the other.
2. Turn both feet at the same time, pivoting on the heel of one foot and the toe of the other.
3. Maintain a good center of gravity while holding or carrying the object.

Avoid Stopping

1. Squat (bending at the hips and knees).
2. Avoid stooping (bending at the waist).

3. Use your leg muscles to return to an upright position.

General Considerations for Performing Physical Tasks

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

Reasons for the use of Proper Body Mechanics

Use proper body mechanics in order to avoid the following:

1. Excessive fatigue.
2. Muscle strains or tears.
3. Skeletal injuries.
4. Injury to the patient.
5. Injury to assisting staff members.

Steps Involved in Properly Moving an Object to a New Location

- (i) Identify the object to be moved.
- (ii) Adopt a stable base of support.
 1. Your feet are separated.
 2. One foot is behind the other.

3. Your back is straight.
- (iii) Grasp the object at its approximate center of gravity.
- (iv) Pull the object toward your body's center of gravity using your arm and leg muscles.
- (v) Re-establish your base of support and appropriate body alignment.
1. Your back is straight.
 2. You have a stable base of support.
 3. You are holding the object approximately at waist height and close to your body.
- (vi) Pivot toward the desired direction of travel.
1. Turn on both feet at the same time.
 2. Maintain a stable balance.
- (vii) Re-establish a stable base of support and appropriate body alignment.
1. Your back is straight.
 2. Your feet are apart, one slightly behind the other.
 3. The object is at hip level, close to your body.
- (viii) Squat and place the object onto the lower area.
1. Bend at the knees and hips.
 2. Maintain a straight back.
 3. Maintain a stable base of support.
 4. Use your arm and leg muscles (as needed) for guidance.
- (ix) Use your leg muscles to resume an upright position

Exercise

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

Assessment

A. Short Answer Questions:

1. What is body mechanics?

2. What are the basic principles of good body mechanics?

3. Explain different techniques of body mechanics

4. What are the reasons for the use of proper body mechanics?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Lifting and pivoting techniques.
- 2. Sprain and strain.
- 3. Centre of gravity and line of gravity.

Part B

Discussed in class the following:

- 1. General considerations for performing physical tasks
- 2. Steps involved in properly moving an object to a new location
- 3. Techniques of body mechanics

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Demonstrate the knowledge of principles and techniques of good body mechanics		

Session 3: Exercise

In this session, you will learn about the purpose, precautions and types of exercises. You will also study about the preparation, after care, risks and results associated with physical exercises.

Relevant Knowledge

Definition

Exercise is physical activity that is planned, structured, and repetitive for the purpose of conditioning any part of the body. Exercise is used to improve health, maintain fitness and is important as a means of physical rehabilitation.

Purpose

Exercise is useful in preventing or treating coronary heart disease, osteoporosis, weakness, diabetes, obesity, and depression. Range of motion is one aspect of exercise important for increasing or maintaining joint function. Strengthening exercises provide appropriate resistance to the muscles to increase endurance and strength. Cardiac rehabilitation exercises are developed and individualized to improve the cardiovascular system for prevention and rehabilitation of cardiac disorders and diseases. A well-balanced exercise programme can improve general health, build endurance, and slow many of the effects of aging. The benefits of exercise not only improve physical health, but also enhance emotional well-being.

Precautions

Before beginning any exercise programme, an evaluation by a physician is recommended to rule out potential health risks. Once health and fitness level are determined and any physical restrictions identified, the individual's exercise programme should begin under the supervision of a healthcare or other trained professional. This is particularly true when exercise is used as a form of rehabilitation. If symptoms of dizziness, nausea, excessive shortness of breath, or chest pain are present during exercise, the individual should stop the activity and inform a physician about these symptoms before resuming activity. Exercise equipment must be checked to determine if it can bear the weight of people of all sizes and shapes. Individuals must be instructed in the proper use of exercise equipment in order to prevent injury.

Range of Motion Exercise

Range of motion exercise refers to activity aimed at improving movement of a specific joint. This motion is influenced by several structures: configuration of bone surfaces within the joint, joint capsule, ligaments, tendons, and muscles acting on the joint. There are three types of range of motion exercises: passive, active, and active assists.

Passive range of motion is movement applied to a joint solely by another person or persons or a passive motion machine. When passive range of motion is applied, the

joint of an individual receiving exercise is completely relaxed while the outside force moves the body part, such as a leg or arm, throughout the available range. Injury, surgery, or immobilization of a joint may affect the normal joint range of motion.

Active range of motion is movement of a joint provided entirely by the individual performing the exercise. In this case, there is no outside force aiding in the movement. Active assist range of motion is described as a joint receiving partial assistance from an outside force. This range of motion may result from the majority of motion applied by an exerciser or by the person or persons assisting the individual. It also may be a half-and-half effort on the joint from each source.

Strengthening Exercise

Strengthening exercise increases muscle strength and mass, bone strength, and the body's metabolism. It can help attain and maintain proper weight and improve body image and self-esteem. A certain level of muscle strength is needed to perform daily activities such as walking, running, and climbing stairs. Strengthening exercises increase muscle strength by putting more strain on a muscle than it is normally accustomed to receiving. This increased load stimulates the growth of proteins inside each muscle cell that allow the muscle as a whole to contract. There is evidence indicating that strength training may be better than aerobic exercise alone for improving self-esteem and body image. Weight training allows one immediate feedback, through observation of progress in muscle growth and improved muscle tone. Strengthening exercise can take the form of isometric, isotonic and isokinetic strengthening.

Isometric Exercise

During isometric exercises, muscles contract. However, there is no motion in the affected joints. The muscle fibers maintain a constant length throughout the entire contraction. The exercises usually are performed against an immovable surface or object such as pressing one's hand against a wall. The muscles of the arm are contracting but the wall is not reacting or moving in response to the physical effort. Isometric training is effective for developing total strength of a particular muscle or group of muscles. It often is used for rehabilitation since the exact area of muscle weakness can be isolated and strengthening can be administered at the proper joint angle. This kind of training can provide a relatively quick and convenient method for overloading and strengthening muscles without any special equipment and with little chance of injury.

Isotonic Exercise

Isotonic exercise differs from isometric exercise in that there is movement of a joint during the muscle contraction. A classic example of an isotonic exercise is weight training with dumbbells and barbells. As the weight is lifted throughout the range of motion, the muscle shortens and lengthens. Calisthenics are also an example of isotonic exercise. These would include chin-ups, push-ups, and sit-ups, all of which use body weight as the resistance force.

Isokinetic Exercise

Isokinetic exercise utilizes machines that control the speed of contraction within the range of motion. Isokinetic exercise attempts to combine the best features of both isometrics and weight training. It provides muscular overload at a constant preset speed while a muscle mobilizes its force through the full range of motion. For example, an isokinetic stationary bicycle set at 90 revolutions per minute means that no matter how hard and fast the exerciser works, the isokinetic properties of the bicycle will allow the exerciser to pedal only as fast as 90 revolutions per minute. Machines known as Cybex and Biodex provide isokinetic results; they generally are used by physical therapists.

Cardiac Rehabilitation

Exercise can be very helpful in prevention and rehabilitation of cardiac disorders and disease. With an exercise programme designed at a level considered safe for the individual, people with symptoms of heart failure can substantially improve their fitness levels. The greatest benefit occurs as muscles improve the efficiency of their oxygen use, which reduces the need for the heart to pump as much blood. While such exercise does not necessarily improve the condition of the heart itself, the increased fitness level reduces the total workload of the heart. The related increase in endurance also should translate into a generally more active lifestyle. Endurance or aerobic routines, such as running, brisk walking, cycling, or swimming, increase the strength and efficiency of the muscles of the heart.

Preparation

A physical examination by a physician is important to determine if strenuous exercise is appropriate or detrimental for an individual, especially when the exercise programme is designed for rehabilitation. Before exercising, proper stretching is important to prevent the possibility of soft tissue injury resulting from tight muscles, tendons, ligaments, and other joint-related structures.

Aftercare

Proper cool down after exercise is important in reducing the occurrence of painful muscle spasms. Proper cool down stretching also may decrease frequency and intensity of muscle stiffness the day following any exercise program.

Risks

Improper warm up can lead to muscle strains. Overexertion without enough time between exercise sessions to recuperate also can lead to muscle strains, resulting in inactivity due to pain. Stress fractures also are a possibility if activities are strenuous over long periods without proper rest. Although exercise is safe for the majority of children and adults, there is still a need for further studies to identify potential risks.

Normal Results

Significant health benefits are obtained by including a moderate amount of physical

exercise in the form of an exercise prescription. This is much like a drug prescription in that it also helps enhance the health of those who take it in the proper dosage. Physical activity plays a positive role in preventing disease and improving overall health status. People of all ages, both male and female, benefit from regular physical activity. Regular exercise also provides significant psychological benefits and improves quality of life.

Abnormal Results

Exercise burnout may occur if an exercise programme is not varied and adequate rest periods are not taken between exercise sessions. Muscle, joint, and cardiac disorders have been noted among people who exercise. However, they often have had preexisting or underlying illnesses.

Exercise

1. Visit a nearby hospital and provide different exercise to any four patients. Record their vital sign before and after exercise. Fill the table given below and compare to changes before and after the exercise

Name of the Patient	Type of exercise given	Vital sign before exercise	Vital sign after exercise	Changes recorded
		BP- P- BP- P-	T- R- T- R-	
		BP- P- BP- P-	T- R- T- R-	
		BP- P- BP- P-	T- R- T- R-	
		BP- P- BP- P-	T- R- T- R-	

2. Make a group and perform different type of physical exercises

Assessment

A. Short Answer Questions:

1. How exercise helps in keeping body fit and healthy?

2. What are the precautions to be taken while exercising?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Isometric, isotonic and isokinetic exercise.
- 2. Normal and abnormal result of exercise.
- 3. Strengthening exercise and range of motion exercise.

Part B

Discussed in class the following:

- 1. Precaution to be taken during exercise.
- 2. After care of performing the exercise
- 3. Risks associated with exercise/warm up

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Suggest exercise according to patient need		
Demonstrate the knowledge of risks associated with physical exercises		

Session 4: Active Range of Motion Exercises

In this session, you will learn about the importance of range of motion exercises and selection of active range of motion exercise. You will also study the difference between techniques of performing various neck exercises, shoulder and elbow exercises, arm and wrist exercises, hand and finger exercises, hip and knee exercises and ankle and foot exercises.

Relevant Knowledge

Range of motion exercises (ROM) are designed to assist patient in recovering or increasing a full range of motion in bending joints such as shoulders, knees, and elbows. For those who suffer a joint injury, undergo surgery, or experience pain in relation to movement, ROM exercises can help to decrease pain, strengthen the muscles surrounding the joint, and enable patient to work out or perform daily tasks with minimal discomfort.

Range of Motion Exercises

Different types of range of motion exercises will be more effective for different patients. With the goal of developing full and normal function of patient's joints, doctor may recommend that patient utilize active ROM exercises, active-assisted ROM exercises, or passive ROM exercises. Patients living with arthritis, sports-related injuries, or healing after joint surgery will likely begin the healing process with passive ROM exercises when he cannot perform the exercise alone, then move to active assisted ROM exercises that include the assistance of a therapist or trainer, and finally to active ROM exercises as he gains strength and can perform the exercises alone.

Active Range of Motion Exercise



Range of motion (ROM) refers to how far a joint moves during exercise and physical therapy. Muscle strength and flexibility are the key components to movement. Lack of activity due to injury or disease lead to a decline in these two vital functions. Range of motion helps maintain movement by stretching the muscles and moving the joints. The terms active and passive define the energy behind the movement.

Active range of motion is exercises patient do on their own.

Active ranges of motion exercises are for people trying to increase or maintain flexibility on their own. They require no assistance to perform simple movements, such as arm circles or flexing of fingers. Passive range of motion refers to someone physically moving a part of patient's body. This requires no effort on the part of the patient. For instance, a therapist may grasp patient's arm gently and move it in a circular motion. For active, patient move the arm; for passive, someone else moves it.

ROM exercises are vital-whether passive or active. Range of motion helps maintain

mobility. Without ROM, some patients lose the flexibility in their joints. For those able to move on their own, active range of motion keeps muscles supple and functioning as well as increasing joint flexibility. Passive ROM prevents bed-ridden or immobile people from developing muscle atrophy, or shortening. Without any ROM, joints eventually lock.

Selection of Active or Passive Range of Motion

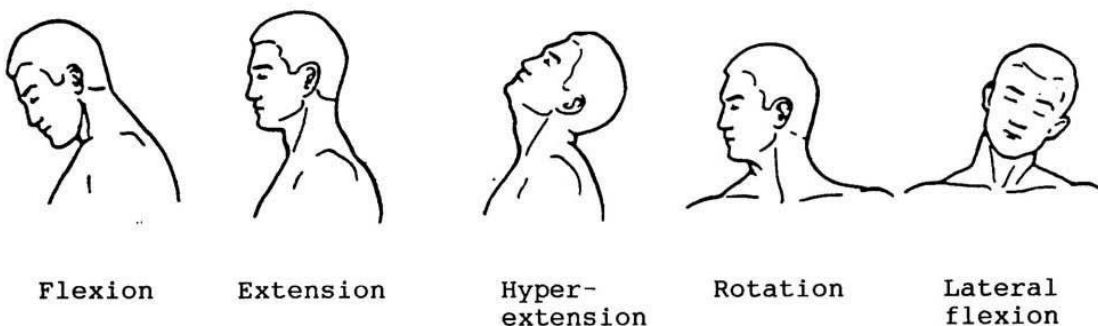
The decision to use active or passive range of motion is dependent on a number of factors. Some people are incapacitated by injury or illness. For these people, passive is the only form of exercise available. Passive ROM is sometimes a testing tool to determine how far a joint can flex. Joints often have better range of motion passively than actively. A person suffering from muscle or nerve damage may benefit from passive ROM even if he can move on his own, because joints can flex further.

Active exercise is necessary to build up muscles.

Active range of motion helps build muscle strength. This means improving the fitness of the muscles and joints at the same time. If a person is able to fully move the limb, active exercises are better to improve toning and strength. Passive ROM only keeps joints flexible. Passive exercise provides just enough movement to maintain joint flexibility.

Neck exercises: Starting position: Patient may sit or stand with face forward. Patient's shoulders should be straight and relaxed.

- Head tilts, forward and back: Gently bow head and try to touch chin to chest. Raise chin back to the starting position. Tilt head back as far as possible so patient is looking up at the ceiling. Return head to the starting position.
- Head tilts, side to side: Tilt head to the side, bringing ear toward shoulder. Return head to the starting position.
- Head turns: Turn head to look over shoulder. Tilt chin down and try to touch it to shoulder. Do not raise shoulder to chin.



Shoulder and elbow exercises: Starting position: Stand or sit. Hold arm straight down at side. Face palms in toward body. It is best to use a chair without arms if patient is in a sitting position.

- Shoulder movement, up and down: Raise arm forward and then up over head. Try to raise it so that inner arm touches ear. Bring arm back down to side. Bring it back as far as possible behind body. Return arm to the starting position.
- Shoulder movement, side to side: Raise arm to the side and then up over head as far as possible. Return arm to side. Bring arm across the front of body and reach for the opposite shoulder. Return arm to the starting position.
- Shoulder rotation: Raise both shoulders up toward ears, as if patient were trying to shrug. Lower them to the starting position, and relax shoulders. Pull shoulders back. Then relax them again. Roll shoulders in a smooth circle. Then roll shoulders in a smooth circle in the other direction.
- Elbow bends: With palm facing forward, bend elbow. Try to touch shoulder with fingertips.



Arm and wrist exercises: Starting position: Sit down. Bend elbow and rest forearm on a flat surface, such as a table or lap. Make sure wrist hangs loosely over the side.

- Wrist bends: Bend hand back toward wrist so that fingers point toward the ceiling. Then bend hand down so that fingers point toward the floor.
- Wrist rotation: Move hand from side to side. Then roll hand in circles in one direction. Roll and in circles in the other direction.
- Palm up, palm down: Stay in the same position, but tuck bent elbow against side. Face palm down. Turn palm so that it faces up toward the ceiling. Then turn palm so it faces down.

Hand and finger exercises: Starting position: Sit or stand. Place hand out in front of patient.

- Finger bends: Make a tight fist. Then open and relax hand.
- Finger spreads: Open hand and stretch the fingers as far apart as possible. Bring fingers together again.

- Finger-to-thumb touches: One at a time, touch each fingertip to the pad of thumb.
- Thumb-to-palm stretches: Move thumb and rest it across palm. Move it out to the side again.

Hip and knee exercises: Starting position: If patient have had a hip injury or surgery, hip exercises directed by caregiver only. Lie flat on the bed with legs flat and straight.

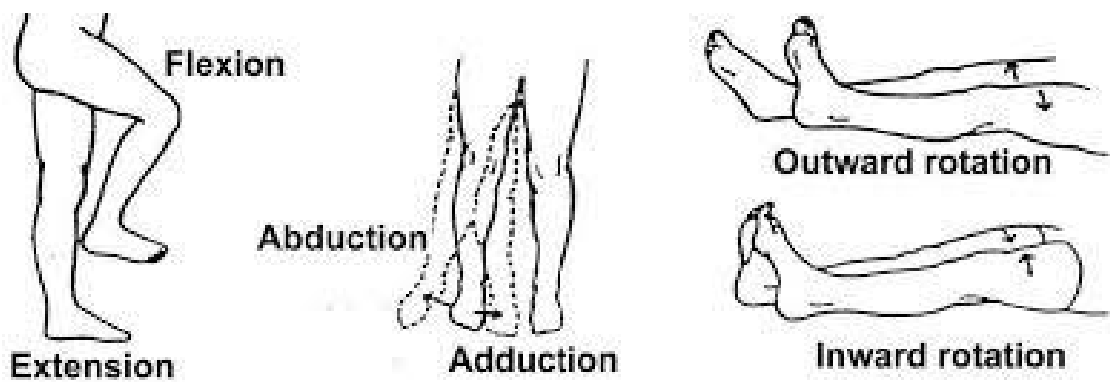
- Hip and knee bends: Point toes. Slowly bend knee up as close to chest as possible. Straighten leg and return it to a flat position on the bed.
- Leg lifts: Raise leg so that foot is 6 to 12 inches (15 to 31 centimeters) off the bed. Hold it in the air. Return leg to the bed.
- Leg movement, side to side: Flex foot so that toes point up toward the ceiling. Move leg out to the side as far as possible. Bring leg back to the middle.
- Leg rotation, in and out: Put leg flat on the bed. Roll leg toward the middle so that big toe touches the bed. Then roll leg out and try to make smallest to touch the bed.
- Knee rotation, in and out: Lie on back on the bed. Bend knee so the bottom of that foot is flat on the bed. Slide heel towards buttocks. Return foot to the starting position.

Ankle and foot exercises: Starting position: Sit in a chair with both feet flat on the floor.

- Ankle bends: Keep toes on the floor and raise heel as high as patient can. Lower heel. Then keep heel on the floor and raise toes as high as patient can.
- Ankle rotation: Raise foot slightly off the floor. Roll ankle in circles. Then roll ankle in circles in the other direction.
- Toe bends: Curl toes down toward the sole (bottom) of foot. Straighten them. Curl them up toward the ceiling. Then straighten them again.
- Toe spreads: Spread toes apart. Bring them together again.

When should I contact my caregiver?

- Patient feels pain when patient do active range of motion exercises.
- Patient has questions or concerns about condition, care, or exercise program.



Exercise

1. Tabulate the Do's and Don'ts for the following steps of workout:

Step of Workout	Do's	Don'ts
Warm up		
Exercise		
Cool Down		
Stretch		

2. Demonstrate the standard procedure of performing the following exercises:

- a) Neck exercises
- b) Shoulder and elbow exercises
- c) Arm and wrist exercises
- d) Hand and finger exercises
- e) Hip and knee exercises
- f) Ankle and foot exercises

Assessment

A. Short Answer Questions:

1. Describe active range of motion exercise

2. Describe passive range of motion exercise

3. What are the benefits of exercise for a patient?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Active ROM and passive ROM exercise
- 2. Neck and shoulder exercise movement
- 3. Elbow and hand exercise movement
- 4. Hip and ankle exercise movement

Part B

Discussed in class the following:

- 1. Importance of active range of motion exercise in maintaining health.
- 2. Types of active ROM exercises

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Demonstrate the knowledge of active range of motion exercise according to patient"s need		
Demonstrate the knowledge of techniques of active ROM exercises		

Session 5: Passive Range of Motion Exercises

In this session, you will learn about the different procedures of passive range of motion exercise.

Relevant Knowledge

Passive range of motion exercises helps keep a person's joints flexible, even if he cannot move by himself/herself. Range of motion is how far the person's joints can be moved in different directions.

The exercises help patient move all the person's joints through their full range of motion. The following are some important points to be kept in mind while giving passive exercises:

- Regular movement helps prevent contractures (permanent shortening of a muscle or joint). Contractures are severely tightened joints and muscles. It develops when the stretchy (elastic) tissues are replaced by non-stretchy (inelastic) fibre-like tissues.
- Patient may do the exercises in any order. Patient may spread the exercises out over the course of the day. All the exercises may be done while the person lies in bed.
- Move the person slowly, gently, and smoothly. Avoid fast or jerky motions.
- Support the area near the joint as shown by the person's caregiver. Move the person's body part with your other hand.
- Each joint should be moved as far it will go. Move each joint to the point where patient feel some resistance. The person may feel discomfort, but do not push to where it hurts. Hold the position a few seconds, and then return the person to a resting position.
- Perform the exercises on both sides. Perform each group of exercises on one side, and then do the same exercises on the other side.

Neck Exercises

Support the person's head with your hands. Gently return the person's head to the middle, facing forward, after each exercise.

- **Head turns:** Turn the person's head to the side. Then turn his head to the other side.
- **Head tilts:** Tilt the person's head, bringing his ear toward his shoulder. Then tilt his head toward the other shoulder.

- **Chin-to-chest:** Gently bow the person's head toward his chest.

Shoulder and Elbow Exercises

Support the person's elbow with one hand. Hold his wrist with your other hand.

- **Shoulder movement, up and down:** Raise the person's arm forward and then up over his head. Bring his arm back down to his side.
- **Shoulder movement, side to side:** Raise the person's arm to the side as far as it will go. Bring his arm back down to his side.
- **Elbow bends:** Place the person's arm at his side with his palm facing up. Bend and straighten his arm.



Forearm and Wrist Exercises

Support the person's wrist with one hand. Hold his fingers with your other hand.



- **Wrist bends:** Bend the person's hand back toward his
- **Wrist rotation:** Rock the person's hand back and forth
- **Palm up, palm down:** Tuck the person's elbow against

Hand and Finger Exercises

Hold the person's hand with both of your hands. Hold his hand out toward yourself, with his fingers long.

- **Finger bends:** Curl the fingers into a fist. Straighten the fingers again. Curl and straighten each finger one at a time. Curl and straighten the thumb.
- **Finger spreads:** Spread the thumb and first finger apart, and then bring them back together. Spread the first finger and middle finger apart, and then bring them back together. Perform the same with the rest of the fingers.
- **Finger-to-thumb touches:** Touch the person's fingertips to the pad of his thumb, one finger at time.
- **Finger rotations:** Roll each finger in a circle in one direction. Roll each finger in the other direction. Roll the thumb in each direction.

Start with person's legs. Put one hand under his knee. Hold his ankle with your other hand.

- Hip and knee bends: Slowly bend the person's knee up as close to his chest as possible. Then gently straighten the leg.
- Leg movement, side to side: Move one leg out to the side, away from the other leg. Bring the leg back to the middle and cross it over the other leg.
- Leg rotation, in and out: Roll one of the person's legs toward the other leg so his toes point in. Then roll his leg out toward the side so his toes point out.

Ankle and Foot Exercises

Put a rolled towel under the person's knee. For the ankle exercises, support the person's ankle with one hand, and his toes with the other hand. For the toe exercises, allow his foot to relax on the bed, and hold only his toes.

- a) Ankle bends: Bend the person's foot so his toes point toward the ceiling. Then bend his foot the other direction so his toes are pointed.
- b) Ankle rotation: Raise the person's foot slightly off the bed. Roll his foot in circles. Then roll his foot in circles in the other direction.
- c) Ankle movement, side to side: Tilt the person's ankle in so the sole of his foot points toward the opposite leg. Then tilt his ankle out so the sole of his foot points away from the opposite leg.
- d) Toe bends: Curl the person's toes down toward the sole of his foot. Straighten them. Curl the toes up toward the ceiling. Then straighten them again.
- e) Toe spreads: Spread the big toe and the second toe apart, then bring them back together. Perform the same with the rest of the toes.

Exercise

1. Demonstrate the following passive ROM exercises to be performed on patient:
 - a) Neck
 - b) Shoulder and elbow
 - c) Fore arm and wrist
 - d) Hand and finger
 - e) Hip and knee
 - f) Ankle and foot

Assessment

A. Short Answer Questions:

1. What are passive range of motion exercises?
2. Why is it important to do passive range of motion
3. What care is to be taken while giving passive exercise?

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

1. Joint movement and muscle movement
2. Head turn and head tilt

Part B

Discussed in class the following:

1. Importance of passive range of motion exercise when a patient cannot perform exercise by him/herself
2. Types of passive ROM exercises
3. Steps involved in performing passive ROM exercises

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Demonstrate the knowledge of passive range of motion exercise according to patient's need		
Demonstrate the knowledge of techniques of passive range of motion exercises		

Session 6: Breathing Exercises

In this session, you will learn about deep breathing and coughing exercises. You will also study the ways to perform the pursed lip breathing, diaphragmatic breathing, abdominal breathing and belly breathing.

Relevant Knowledge



Breathing Exercise: Breathing exercises include any form of exercise in which a client switches from shallow rapid breathing to deeper slower breathing. The most refined of breathing exercises have been developed in Yoga. Breathing exercises improve blood circulation, calm nerves and draw in vital substances (of an unspecified nature) which are not normally inhaled.

Deep breathing and coughing

It is important to do deep breathing and coughing exercises as these will help to lower patient's risk of lung complications, especially after surgery. Lung tissues are made up of many air sacs (alveolar sacs), which are fully expanded during normal breathing. After surgery, it is common for patient to take shallow breaths because of pain or limited mobility. Sometimes this may causes secretions (phlegm/mucous) to stay in patient's lungs and collapse the air sacs. This is known as atelectasis.

Breathing deeply: Follow the instructions given below:

- Moves air down to the bottom areas of the lungs
- Opens air passages and moves mucous out (coughing is also easier)
- Helps the blood and oxygen supply to lungs, boosting circulation
- Lowers the risk of lung complications such as pneumonia and infections

Coughing helps bring up mucous from deep within 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 to cough is sitting upright. Hold a pillow or rolled-up 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

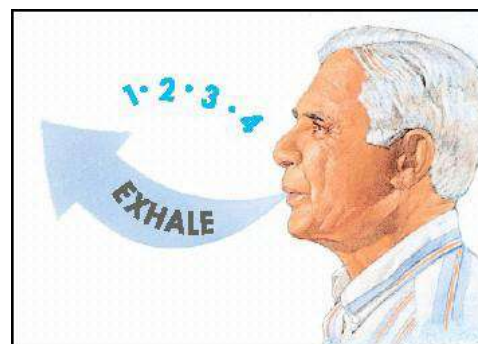
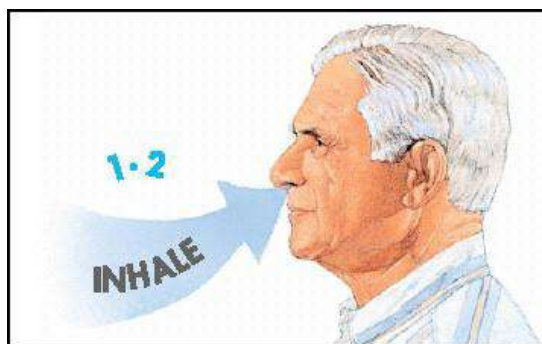
Because of pain after surgery, patients often do not take deep breaths, causing mucus to collect in the lungs. By taking deep breaths, cough mucus out and prevent it from collecting. Patient should continue deep-breathing exercises throughout their stay at hospital. The most comfortable position for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

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, physical therapists and respiratory therapists teach the technique to their patients to ease shortness of breath and to promote deep breathing, also referred to as abdominal or diaphragmatic breathing. The purpose of PLB is to create back-pressure inside airways to splint them open; moving air thus then takes less work.

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 patient have chronic obstructive pulmonary disease, or COPD, shortness of breath may be a daily and unwelcome fact of life. The GDA 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 in for two seconds through nose, keeping mouth closed.
3. Breathe out for four seconds through pursed lips. If this is too long for patient, simply breathe out twice as long as patient breathes in.

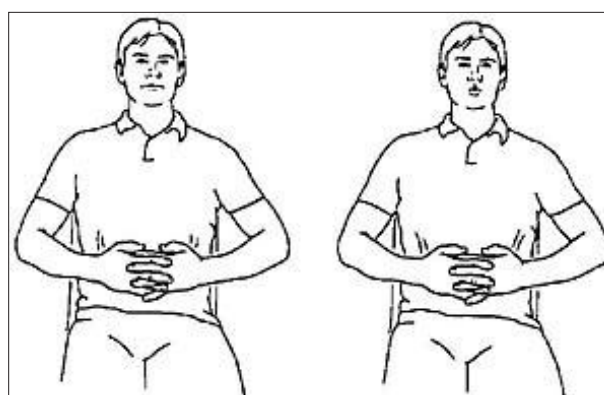
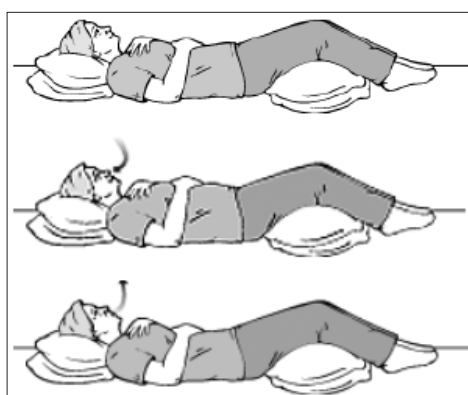


Diaphragmatic Breathing, Abdominal Breathing, Belly Breathing or Deep Breathing is breathing that is done by contracting the diaphragm, a muscle located horizontally between the chest cavity and stomach cavity. Air enters the lungs and the belly expands during this type of breathing. This deep breathing is marked by expansion of the abdomen rather than the chest when breathing. It is considered by some to be a healthier way to breathe, and is considered by some a useful form of complementary and alternative treatment.

Diaphragmatic breathing allows one to take normal breaths while maximizing the amount of oxygen that goes into the blood stream. It is a way of interrupting the 'Fight or Flight' response and triggering the body's normal relaxation response.

Deep breathing exercises are sometimes used as a form of relaxation, that, when practiced regularly, may lead to the relief or prevention of symptoms commonly associated with stress, which may include high blood pressure, headaches, stomach conditions, depression, anxiety, and others.

Due to the lung expansion being lower (inferior) on the body as opposed to higher up (superior), it is referred to as 'deep' and the higher lung expansion of rib cage breathing is referred to as 'shallow'. The actual volume of air taken into the lungs with either means varies.



Exercie

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

Assessment

A. Short Answer Questions:

1. Describe the procedure of breathing exercise?

2. Describe the procedure of coughing exercise?

B. Fill in the blanks:

- 1. _____ and _____ exercises helps to lower patient's risk of lung complications after surgery.
- 2. The most comfortable position in which to cough is _____
- 3. The Triflo has balls inside a clear plastic box _____
- 4. The purpose of PLB is to create inside airways to splint them open _____

C. Write the full form of the following abbreviations:

- 1. PLB: _____
- 2. COPD: _____
- 3. CAM: _____

Checklist for Assessment Activity

Use the following checklist to see if you have met all the requirements for assessment activity:

Part A

Differentiated between the following:

- 1. Deep breathing and coughing exercise
- 2. Pursed lip and diaphragmatic exercise

3. Deep and shallow breathing

Part B

Discussed in class the following:

- 1. Role of GDA in providing breathing exercise for the patient undergoing surgery
- 2. Deep breathing exercises and coughing exercises

Part C

Performance Standards

The performance standard may include, but not limited to:

Performance standards	Yes	No
Demonstrate the knowledge of deep breathing and coughing exercises		
Perform diaphragmatic breathing, abdominal breathing and belly breathing exercises		

Notes

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