WELCOME

TO



This is an Education Platform

We provide Free PDF Notes and Videos Classes for Pharmacy Students

Web Site http://www.fdspharmacy.in/

You tube https://www.youtube.com/channel/UC77iEsiuZolU4pB8WAJIR5Q

What app https://chat.whatsapp.com/IzSgXtFEvhS4LN5xhUgq5z

Telegram https://t.me/+cvxm17xSloA4MjVl

Face book https://www.facebook.com/Fdspharmacy-105764311994440/

E-mail fdspharmacyinfo@gmail.com

Diploma in Pharmacy 2nd Year
Hospital & Clinical Pharmacy
Experiment

To demonstrate / simulated/hands-on experience on the identification, types, use/application /administration of needles, syringes, catheters, IV set, urine bag, RYLE's tube, urine pots, colostomy bags and oxygen masks.

Aim:

To demonstrate / simulated/hands-on experience on the identification, types, use/application /administration of needles, syringes, catheters, IV set, urine bag, RYLE's tube, urine pots, colostomy bags and oxygen masks.

Reference :

‘ Dr. Gupta G.D. , Dr. Sharma Shailesh, Dr. Sharma Anshu, “Practical Manual of Hospital & Clinical Pharmacy” Published by Nirali Prakashan, Page no 35 - 39

Theory :

1) **Needle:** Surgical needle allows the suture to be placed into the tissue, to carry the material through (with negligible stress).

   Characteristics of an Ideal Needle

   i) A needle should be sharp enough to pierce through tissue and cause negligible resistance.
   ii) It should be stiff enough to inhibit bending.
   iii) It should also be flexible to avoid breaking
   iv) It should be thin so that it causes the least amount of discomfort and pain.

v) It should be stable inside the holder to ensure precise positioning.
vi) It should be completely sterile.
vii) It should be resistant to corrosion.

Uses of Needle

i) The force required to pass the needle through tissue should be applied in a direction following the needle's curvature.
ii) It is important to match the needle size to the size of tissue bite required. Bending can occur when a needle being used is too small for the tissue bite.
iii) In case the needle's position in the tissue has to be altered, it should be removed and reinserted instead of twisting in the tissue.
iv) The needle should not be used to bridge a wound and should be inserted separately into each side of the tissue to be approximated.

Needle is hollow and is commonly used with a syringe to inject medicine into the body or withdraw fluids from the body, e.g., taking blood samples from a vein. Based on the body area to be injected, patient's size, and route (depth) used, needle length ranges from % inch to 4 inches. For example, intradermal injections use short needle (% inch); subcutaneous injections use ½ or%½ inch long needle, intramuscular injections use longer needles (1 inch, 1½ inch, 2 inches, 2½ inches, or 3 inches) to deposit drugs, based on the muscle used and the patient's size

Types

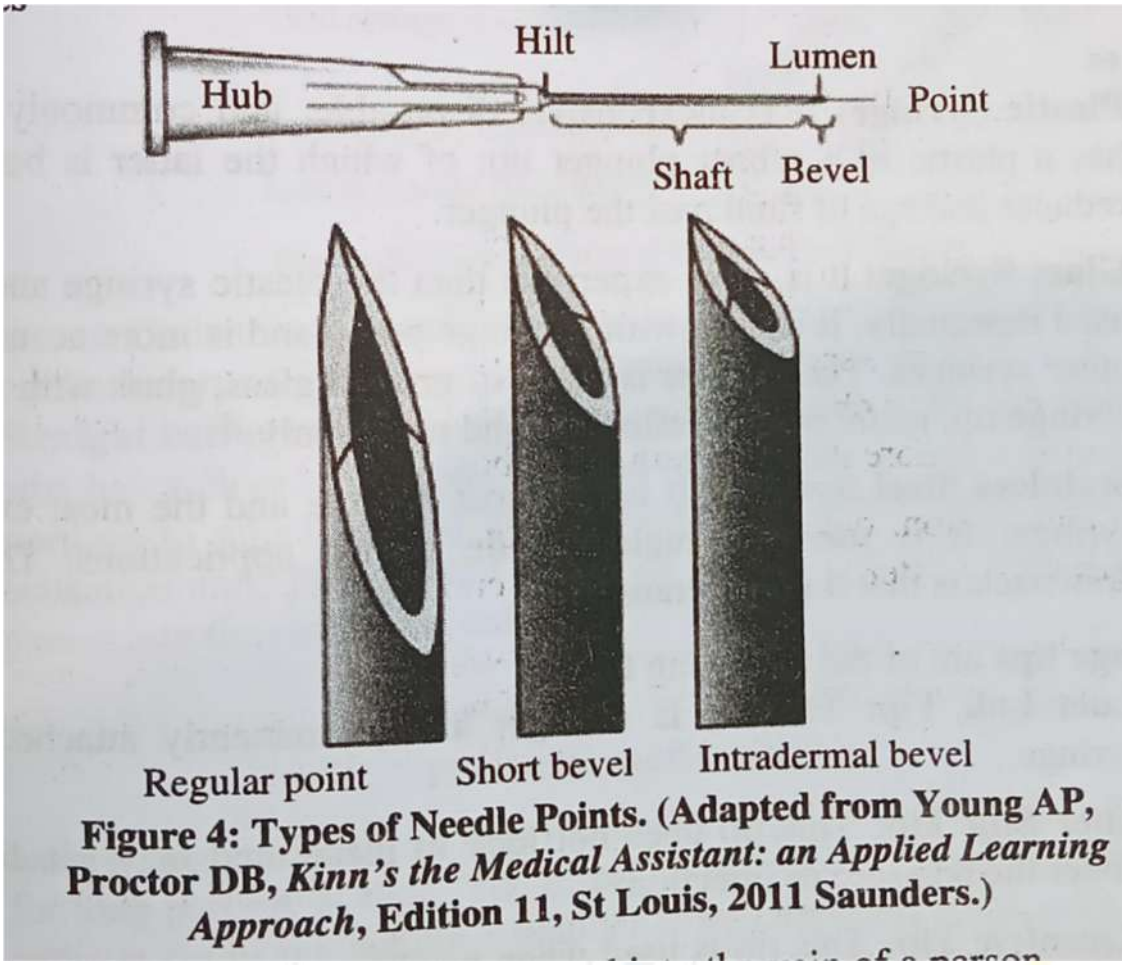


Figure 4: Types of Needle Points. (Adapted from Young AP, Proctor DB, *Kinn's the Medical Assistant: an Applied Learning Approach*, Edition 11, St Louis, 2011 Saunders.)

i) **Intravenous Needle :** It is inserted into the vein of a person.

ii) **Safety Needle :** It is used in almost all medical setting to decrease the risk of needle stick injury.

iii) **Winged or Butterfly Needle :** Its wings get attached to a slender and flexible catheter line.

Parts: In a needle, there are three parts:

i) **Hub:** It is present at one end of the needle and is attached to the syringe.

ii) **Shaft:** It is the long slender stem of the needle that is bevelled at one end to form a point.

iii) **Bevel:** It is the angled surface that forms on the tube when sharpened to make a needle point. Three bevels are present in a typical needle point:

a. **Primary Bevel:** It is formed as a result of grinding the tube at a specific angle.

b. **Two Side Bevel or Secondary Grinds: These** are present on each side of the primary bevel to form a sharp needle point and cutting edge. In short bevel needles, the secondary bevels are present below the flat bevel, called back-bevels.

2) Syringes: Karl Schneider (a mechanic of Paris) in 1896 invented glass syringes having a cylindrical piston ground to fit a graduated glass barrel. Dickinson in 1925 invented the Luer-Lok syringe having a thread within the metal tip that engages the rim of the needle.

A medical syringe is used for injecting fluid into or withdrawing fluid from the body. It consists of a needle attached to a hollow cylinder, fitted with. sliding plunger. Fluid is injected into the body by the downward movement of plunger and fluid is withdrawn by the upward movement. Disposable material (plastic) is used for making syringes.

Types

i) **Plastic Syringe:** It is inexpensive, disposable, and commonly used. It has a plastic or a rubber plunger tip; of which the latter is better as it reduces leakage of fluid past the plunger.

ii) **Glass Syringe:** It is more expensive than the plastic syringe and can be used repeatedly. It is used with a syringe pump and is more accurate than other syringes. The plunger is made of

ground glass, glass with a Teflon syringe tip, metal with a Teflon tip, and metal-only.

iii) Stainless Steel Syringe: It is the most durable and the most expensive syringe. It is used for high-pressure dosing applications. The main drawback is that it is non-transparent.

Syringe tips are of the following types:

i) **Luer-Lok Tip:** This tip is stronger and permanently attached to the syringe.

ii) **Luer Slip Tip:** This tip does not lock in place, and may get displaced under the pressure of injection.

iii) **Eccentric Tip:** This tip is used when needle is to be kept parallel to the injection field.

iv) **Catheter Tip:** This tip is used for irrigation (and not for injection).

Special Syringes

i) Insulin Syringe: It is a very small-sized non-Luer-Lock syringe. It has it permanently fixed needle tip. Its capacity is only 1 millilitre of liquid and is used for subcutaneous injections with a very thin and short needle.

ii) Tuberculin Syringe: It is used in tuberculosis. It is a very small syringe with capacity of only 1 millilitre of liquid.

iii) Oral Syringe: It is used to deliver oral medication, therefore do not have a needle. It is available in 1-5 millilitre capacity.

iv) Syringe for Allergy: It is usually a larger syringe and has a thin needle as it is used to deliver large quantity of medicine by subcutaneous route. Sometimes, it may have longer needles if the medication is to be injected intramuscularly.

v) Safety Syringe: It uses a type of safety system to prevent injuries to the needle, or to prevent needle contamination.

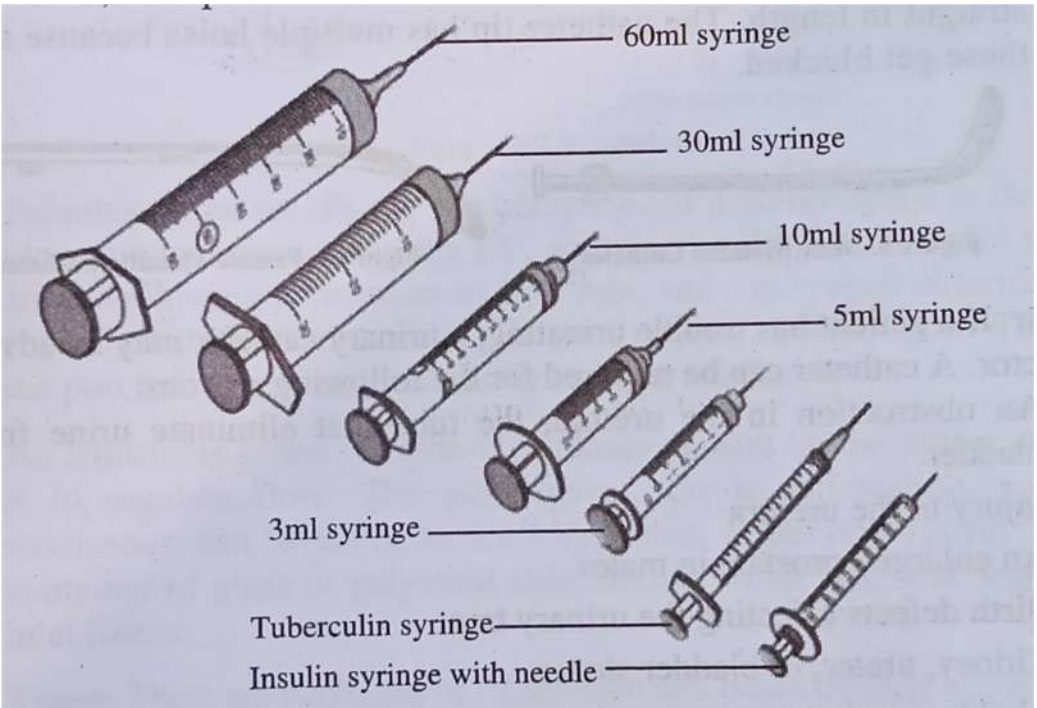


Figure 5: Various Sizes of Disposable Syringes

3) **Catheters:** Catheters are used for collecting urine from unconscious patients. Types: Catheters of different types are available in the market.

   i) **Straight catheter** (**figure 6**) has a small tube of flexible soft rubber. This tube has a closed solid tip. One end of the catheter has a funnel-shaped opening to attach it to a glass junction or another tube attached to at collection unit. The inserted end has a wide opening through which urine passes into the collection unit.

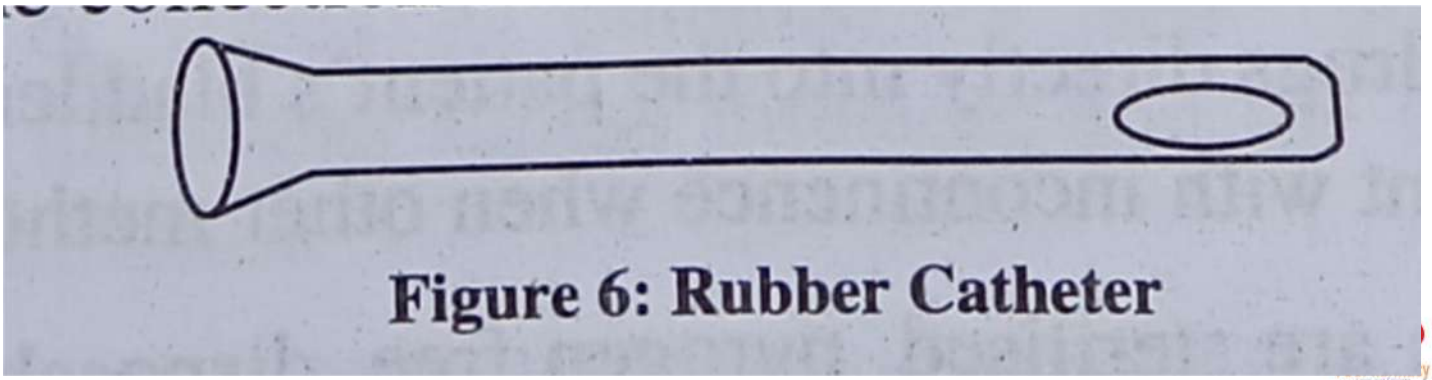


Figure 6: Rubber Catheter

ii) **Indwelling retention** or **Foley catheter (figure 7)** remains in the urethra for long periods of time. The insertion end has a balloon which locks the catheter tip in the patient's bladder to prevent it from slipping out. Two channels run from the insertion tip to the end of the Foley catheter, one channel is for passing urine and the other is for injecting sterilised water to inflate the balloon.

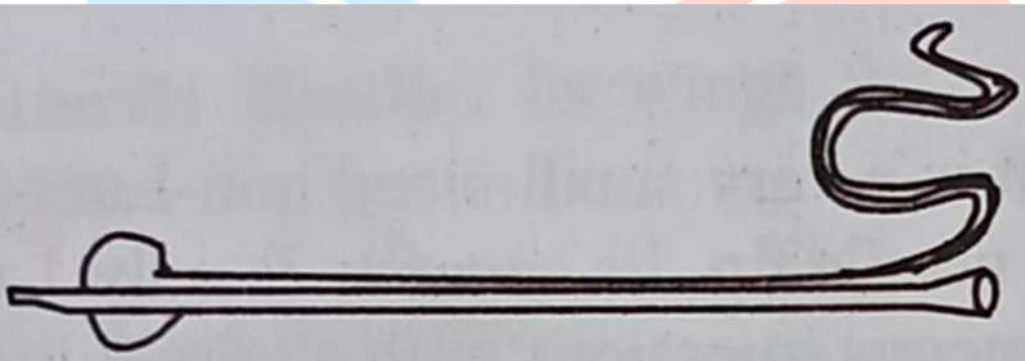


Figure 7: Foley Catheter

iii) **Metallic catheters** are available separately for males and females. The male metallic catheter (figure 8) is curved because the male urethra is curved along its length. The two eyes of the catheter are not at the same level as this would make the catheter weak at the spot.

The two rings on the catheter handle have threads attached to hold the catheter in position. The other end of the threads is tied to the patient's thigh on either side. The female metallic catheter (figure 9) is short and straight because the female urethra is also short and straight in length. The catheter tip has multiple holes because some of these get blocked.

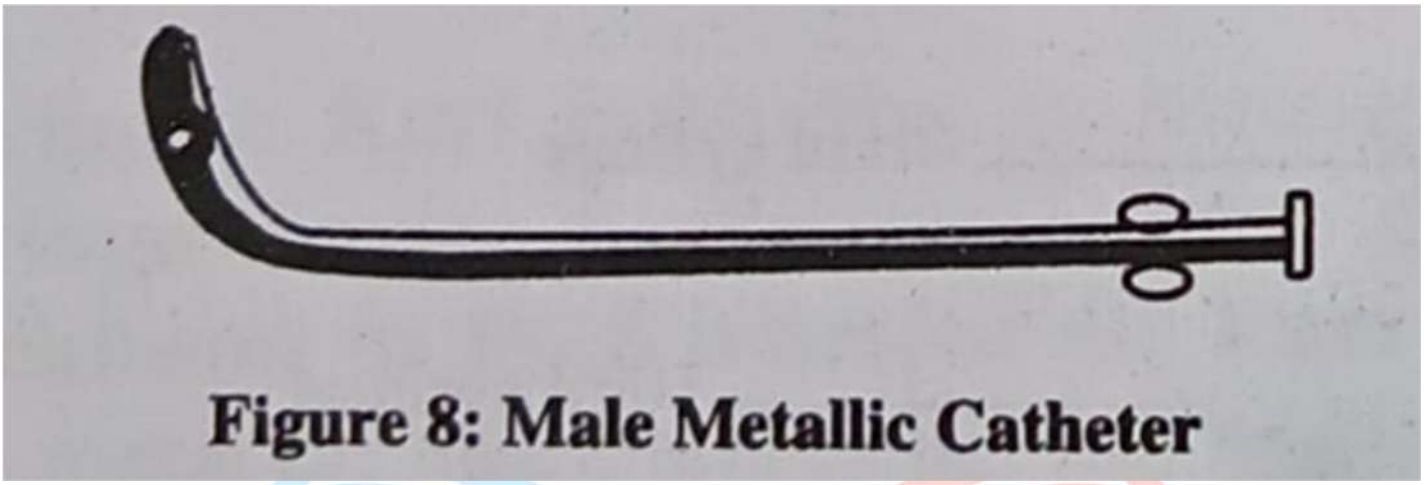


Figure 8: Male Metallic Catheter

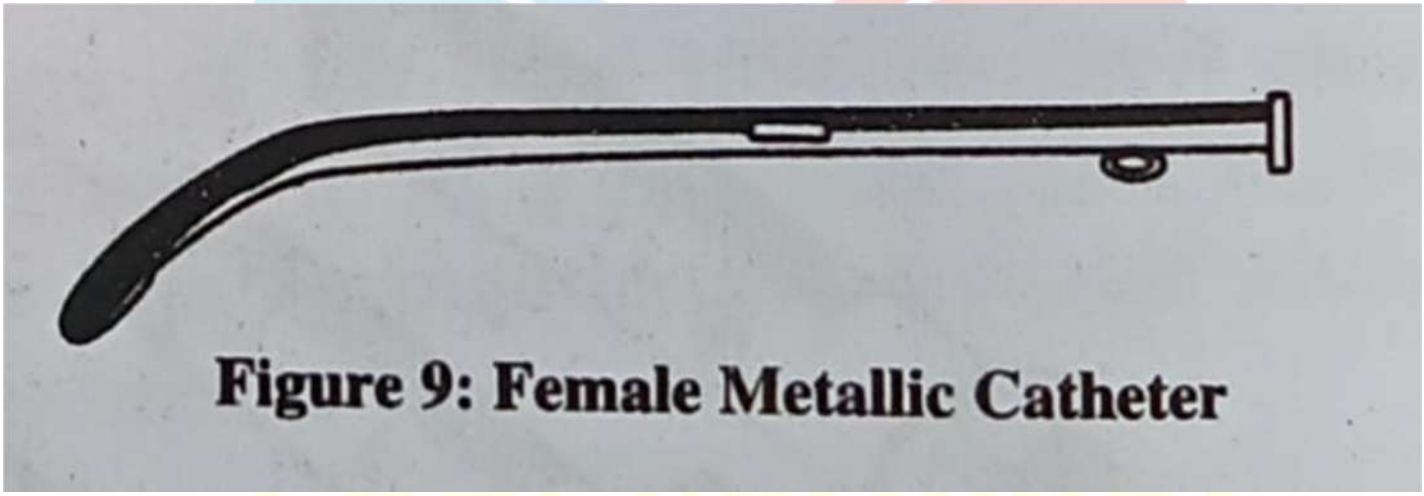


Figure 9: Female Metallic Catheter

Uses: If a patient has trouble urinating, a urinary catheter may be advised by a doctor. A catheter can be required for the following reasons:

i) An obstruction in the urethra, the tube that eliminate urine from the bladder.
ii) Injury to the urethra
iii) An enlarged prostate in males
iv) Birth defects affecting the urinary tract
v) Kidney, ureter, or bladder stones
vi) Bladder weakness or nerve damage

vii) Cancers of the reproductive or urinary tract.

A urinary catheter may also be inserted by a healthcare provide:

i) To precisely measure urine output in severely ill patient.
ii) To empty patient's bladder before, during, or after surgery.
iii) To empty women's bladder after an epidural anaesthetic during childbirth.
iv) To administer drugs directly into the patient's bladder.
v) To treat a patient with incontinence when other methods failed.

4) L.V. Sets : I.V. sets are sterilised, pyrogen free, disposable, and are used for delivering fluid via intravenous route. They are made up of the following

three parts :

i) Needle or intravenous catheter,
ii) Administration set, and
iii) Liquid container.

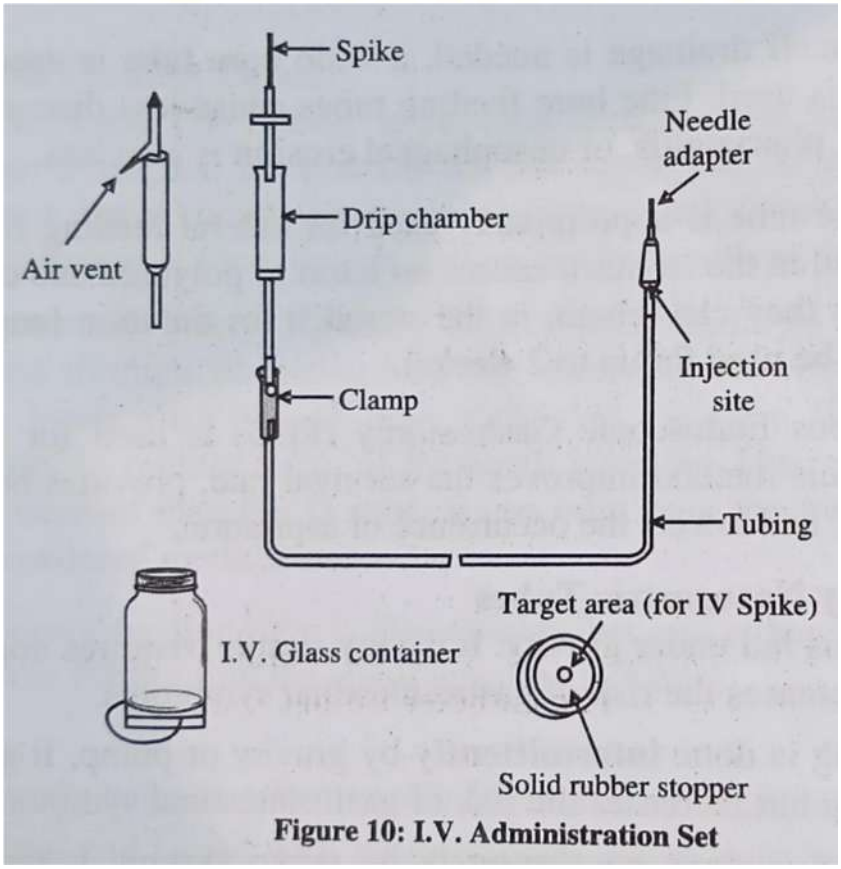


Figure 10: I.V. Administration Set

Administration set (figure 10) comprises of a plastic spike to the rubber closure or plastic seal on the I.V. container, a drip chamber for trapping air and allowing adjustment of flow rate, and a polyvinyl chloride tubing (of length 150-450cm) ending in gum rubber injection port. The tip of the port has a fixed rigid needle or catheter adapter.

An adjustable screw or roller type clamp present on the tubing, squeezes it to regulate flow. The gum-rubber port is self-sealing, so further medication can be added to the I.V. system at the entry ports. The I.V. container of glass or polyvinyl chloride has no air tube and requires air- inlet filters.

Types : There are two types of IV infusion sets based on their intended uses :

i) **Microdrip Set :** This set is suitable for paediatric patients and specific adult patients who require a small, carefully dosed IV fluid since it distributes a small amount with each drop.

ii) **Macrodrip Set :** This set delivers a significant amount of IV fluid with each drop, allowing for quick infusion of huge volumes.

Common Uses for IV Sets

In medical field, IV administration sets are frequently used to administer medications or fluids to patients. IV sets can be used for blood transfusions, infectious illness infusion, and the infusion of life-saving drugs like antibiotics.

Chemotherapy and other long-duration infusions are also administered using IV sets. For a range of therapies, including vitamin infusion therapy, IV sets are also used as home infusion settings.

5) **Ryle's Tubes:** This tube is a narrow nasogastric tube passed into the stomach via nose to provide short-or medium-term nutritional support, and for aspiration of stomach contents such as for decompression of intestinal

obstruction. If drainage is needed, a wide bore tube is used; or else, a finer bore tube is used. Fine bore feeding tubes cause less discomfort and the risk of rhinitis, pharyngitis, or oesophageal erosion is also less.

Nasogastric tube is appropriately used for enteral feeding for up to 6 weeks Gastric acid in the stomach causes no harm to polyurethane or silicone feeding tubes, thus they can remain in the stomach for duration longer than the PVC tubes (can be used for up to 2 weeks).

Percutaneous Endoscopic Gastrostomy (PEG) is used for long-term enteral feeding. This method improves the survival rate, provides better toleration by the patient, and lowers the occurrence of aspiration.

Feeding by Nasogastric Tubes

i) Bolus is fed under gravity. It is very simple, requires nominal equipment, but increases the risk of gastrointestinal symptoms.

ii) Feeding is done intermittently by gravity or pump. It gives time free of feeding but increases the risk of gastrointestinal symptoms.

iii) Feeding is done continuously by pump system. It reduces the risk of gastrointestinal symptoms, but the patient's movement is restricted as he/she mostly remains connected to the system.

iv) Semi-recumbent positioning of the patient reduces the risk of airway aspiration.

v) Feed contamination is minimised by careful handling and using closed rather than open systems.

The nasogastric feeding route is contraindicated in patients having high risk of aspiration, gastric stasis, gastroesophageal reflux, nasal injuries, and fractured base of skull.

Types of Feeding Tubes: The type of feeding tube utilised will depend on epidemiology of the problem. Some can only be used safely for about 14 days because they are only meant to be temporary. The larynx (voice box) and tissues in the throat or oesophagus can be damaged if they are used for an extended period of time.

Some are intended to be long-term or perhaps be permanent. They can be utilised for months or throughout a lifetime. They can be removed when necessary, but doing so does not cause the same problem.

i) **Short-Term Feeding Tubes**

a) Nasogastric (NG) Tube: This type of tube is inserted both in the nose and the throat. It rests in the stomach after being inserted into the oesophagus. A long-term feeding tube may be used in its place after it has been in place for four to six weeks.

b) Orogastric (OG) Tube: This tube is similar to NG tube, but it is inserted into the mouth. It rests into the stomach after travelling the same path through the throat and oesophagus. It may take up to two weeks before it is removed or replaced.

ii) **Long Term Feeding Tubes**

a) Gastric Tube (G Tube): It provides direct access to the stomach through a surgical incision on the left upper side of abdomen. This indicates that it completely avoids the mouth and throat. It enables the administration of food, liquids, and medications without swallowing.

b) Jejunostomy Tube (J Tube): This tube is similar to G tube and is inserted through an incision in the abdomen. However, this cut is made lower than the G tube such that the tube finishes in the jejunum, or middle third, of the small intestine. Due to its tendency to be smaller than the G tube, it can only pass through thin liquids and powdered medications.

Temporary feeding tube is also similar that end either in stomach (G tubes) or further into the small intestine (J tubes).

Key Features:

i) It significantly helps in effective administration and aspiration.

ii) Closed distal end coned with radio-opaque, which aids in precise Ryles tube insertion.

iii) The tube is marked every five centimetres from tip to toe to ensure precise placement.

iv) PVC tubing is soft, frosted, and kink-resistant

v) A colour-coded funnel end connector is present for easy identification of size.

vi) It is available with or without Luer connector.

vii) Ryles tubes are made of PVC medical quality.

Advantages:

i) **Affordability :** The NG tube has proven to be useful in treating gastrointestinal illnesses, and most doctors continue to use it because of its low cost.

ii) **Availability :** In most cases, it is easily accessible Minimal anaesthesia is needed for its insertion.

iii) **Easy to Pass :** The patient's act of swallowing increases the ease of passage once it has passed the oropharynx.

Uses : It is a disposable polyvinyl chloride tube that can be used for both treatment and diagnosis. It is mostly utilised for feeding in patients with PEM, unconscious patients, and lower cranial nerve palsies. In cases of poisoning, stomach lavage is another usage for it.

In cases of hematemesis, intestinal obstruction, post-surgery, and gastric acid aspiration for gastric function tests, it is used to aspirate gastric contents. It is used for barium examinations in the radiology division. It may be inserted in the duodenum for the diagnosis of giardiasis.

6) Urinal Pot : This is a plastic or metal receptacle for urine. It is used by male bedridden patients to void the urine. They should be assisted by the nurse to void into a urinal in bed.

Purpose

i) To promote comfort.

ii) To assist in voiding urine.

iii) To prevent bed wetting.

iv) To maintain urinary output record.

v) To minimise physical strain.

Equipment

i) Clean urinal.
ii) Disposable gloves.
iii) Clean linen.
iv) Wash basin, mug and water.
v) Soap with soap dish.
vi) Measuring jar.

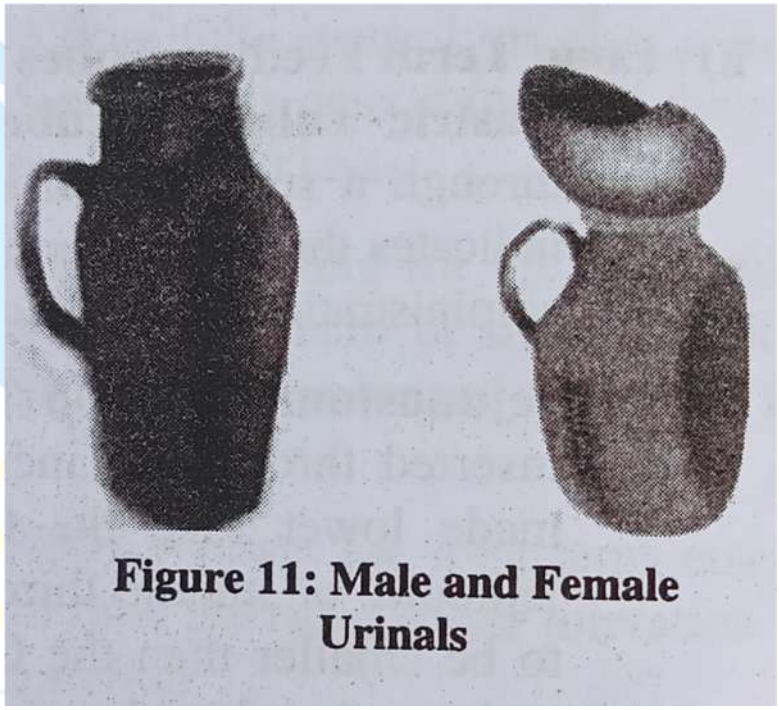


Figure 11: Male and Female Urinals

Uses of Urinal Pot: This is a container that is used to store urine. Its shape makes it suitable for both men and women. However, using a bedpan can be more suitable for some women. One should be calm when helping someone with a urinal.

7) **Colostomy Bag:** It is a plastic bag that is placed over a stoma in the abdominal wall to collect faeces from the digestive tract. Immediately after a colostomy operation, a bag is attached to the stoma by the doctor.

Part of a patient's large intestine is removed through the stoma by surgeon during a colostomy. As the stool travels through the gut, the colostomy bag can catch it. A patient frequently requires a

colostomy due to an infection, sickness, or another problem with the lower bowels. The colostomy is sometimes only temporary. The colostomy may be permanent in other circumstances, such as when the colon has been removed owing to colon cancer.

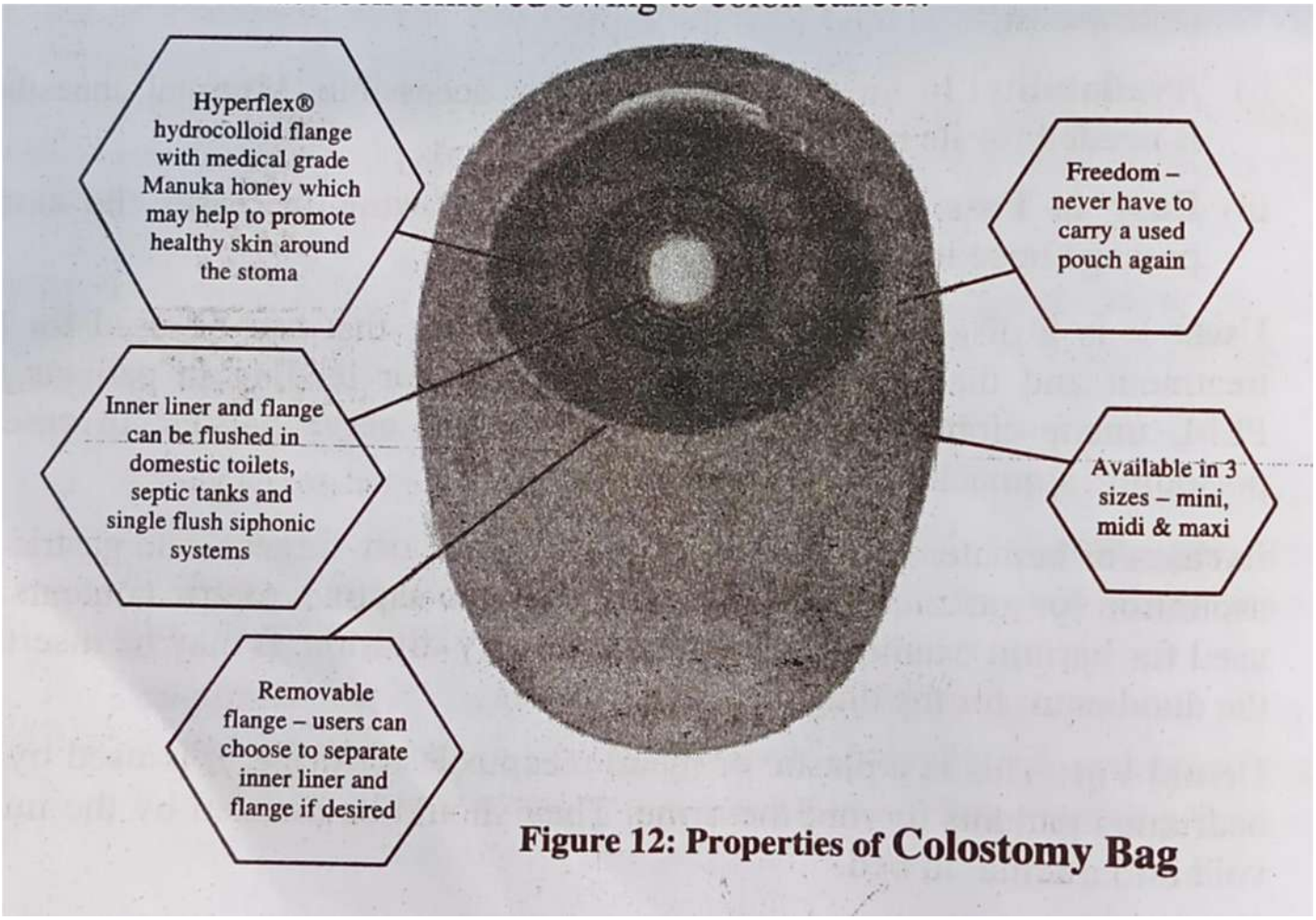


Figure 12: Properties of Colostomy Bag

Types of Bags

i) One-Piece System: This is attached with a gentle adhesive and fits over the stoma. When a fresh bag is required then it should be replaced with new one. These systems use flushable liners in some cases.

ii) **Two-Piece System:** Stoma is surrounded by a base plate that you snugly fasten a bag to. The base plate is typically changed every two to three days, while the bag is changed as needed.

iii) **Closed Bags:** While using them, firm stools work best. It will be changed twice daily. Some of them contain unique liners that can be flushed down the toilet.

iv) **Drainable Bags:** They are suited if faeces are very liquid. They can be voided through an opening at the bottom. They should be changed at every two to three days.

v) **Mini Pouches:** These small bags are only worn for a short duration of time.

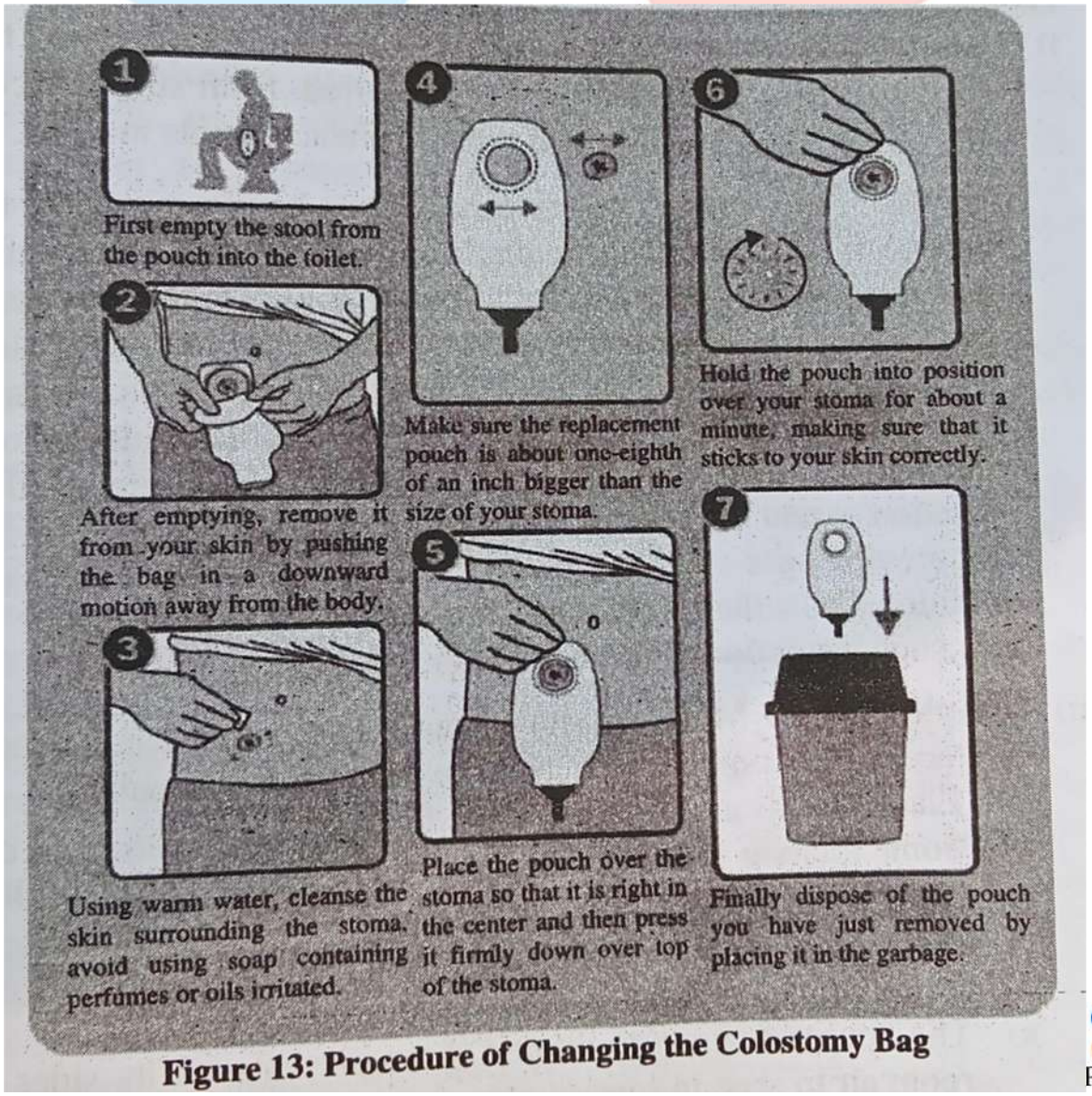


Figure 13: Procedure of Changing the Colostomy Bag

Caring for the Stoma

i) The pouch should be voided when it is between one-third to half full.
ii) The pouch should be changed regularly, before it leaks. (The suggested maximum life of a bag is seven days).
iii) Creams should not be used because they reduce sticking the bag.
iv) Skin should be washed with water, and dried completely before applying new pouch.
v) Skin barrier should be held against body for 30-60 seconds after applying it. The pressure and heat will help the adhesive.
vi) A night drainage system should be used or user should get up during night regularly to void the pouch.
vii) The stoma should be looked after so that it

It is important to take care of the skin around the stoma to be.

i) Healthy
ii) Free of irritation
iii) Look just like the skin elsewhere on your abdomen

To avoid skin irritation:

i) A skin barrier should be used.
ii) Pouch should be applied in such a way that it fits properly.
iii) Peristomal skin should be examined carefully while changing the bag.
iv) If swelling, redness, or rash appears then it should be notified.

8) Oxygen Face Mask:

i) Simple Face Mask: The patient's inspiratory flow, mask fit/size, and respiratory rate will affect the FiO, inspired. Both simple face masks (in several sizes) and tracheostomy masks are accessible at RCH.

Any face mask or tracheostomy mask must have a minimum flow rate of 4 LPM to prevent CO_2 accumulation and rebreathing. Suitable mask should be selected that fits a child's nose bridge to the jaw cleft, and then the nose clip and head strap should be adjusted to keep it in place. Oxygen (intact upper airway) delivered via simple face mask at 4LPM flow rates does not require humidification Humidification may be necessary or appropriate for patients with increased/thickened secretions, secretion retention, or for nonspecific pain and compliance, though compressed gas is drying and may harm the tracheal mucosa. Additionally, the inhalation of dry gases might exacerbate bronchoconstriction in some disorders (such as asthma).

ii) Simple Oxygen Mask: A simple mask is one that can be molded to fit the face and is composed of clear, flexible, plastic or rubber.

a) Elastic bands are used to secure it to the head.
b) Some include a metal clip that can be bent to fit comfortably across the nose bridge.
c) It delivers 35% to 60% oxygen.
d) It has a flow rate of 6-10 liters per minute.
e) The source oxygen is diluted through vents on its sides that allow room air to seep in several places.
f) It is commonly used when a rapid increase in oxygen delivery is required (ie, less than 12 hours).

Types of Oxygen Mask

i) **Non-Rebreather Masks:** It is the most suitable for patients who require sustained high-concentration oxygen therapy since it effectively administers oxygen to the patient. To enhance greater patient comfort, the intersurgical non-

rebreather mask has a soft, thermoplastic face seal. It is available in both adult and child sizes and is a component of the ground- breaking EcoLite design. The non-rebreather mask is MRI compatible since it does not require a separate metal nose clip and includes a curved nose seal that keeps oxygen from getting into the patient's eyes. Respi- check non-rebreather mask is suitable when a visible signal of a patient's respiratory rate is required, such as in a critical care situation.

ii) **Nebuliser Masks:** Patients who are experiencing problems with breathing and need treatment right away, such as in the case of an asthma attack, can use a nebulizer to transform a drug solution into a small mist spray that is then mixed with oxygen or air and inhaled by them. For the patients who require nebulised therapy, whether self-administered with nebulizer machine or by ambulance workers responding to emergency calls, the Intersurgical ECO Nebuliser Mask provides a comfortable and useful alternative. Nebulizers are now a practical solution for patients who require additional breathing support at home thanks to recent design improvements that include a reduction in their size and noise.

iii) **Venturi Masks:** Intersurgical developed the EcoLite design, a lightweight mask with good visibility and a softer outer seal, by combining two materials using the most recent technology. This minimises the intake of ambient air and offers a comfortable fit for a variety of face shapes. For patients who require controlled oxygen therapy and a high oxygen flow, Intersurgical 60% venturi mask offers an ideal fit for maximum effectiveness. Venturi masks deliver a precise amount of oxygen to anyone with acute or chronic respiratory distress.

Oxygen Safety

Despite not being a flammable gas, oxygen promotes combustion (rapid burning). As a result, the following rules should be followed:

i) Smoking should not be done near oxygen equipment.
ii) Aerosol sprays should not be used in the same room as the oxygen equipment.
iii) Oxygen should be immediately turned off when not in use. Fabric will become more combustible as a result of oxygen, which is heavier than air and will collect there. The nasal prongs or mask should not be placed under or over the bed coverings or cushions when the oxygen is being supplied.
iv) Oxygen cylinders should be secured safely to avoid injury.
v) Oxygen cylinders should not be used in hot places.
vi) The oxygen equipment should be kept out of reach of children.
vii) Petroleum products or petroleum by-products eg. Petroleum jelly/Vaseline should not be used while using oxygen.

Advantages: It may provide enhanced oxygen delivery for a short period of time.

Disadvantages

i) Tight seal required to deliver higher concentration
ii) Tight seal is necessary to deliver a higher concentration.
iii) Difficult to keep mask in position over nose and mouth
iv) It is difficult to maintain the mask in place over the mouth and nose.
v) Potential for skin breakdown (pressure, moisture)
vi) There is a risk of skin breakdown (pressure, moisture)
vii) Uncomfortable for pt while eating or talking

viii) It causes discomfort to the patient while eating or talking.
ix) Expensive with nasal tube
x) It may be expensive with nasal tube.

Uses: Nasal cannulas and face masks are typically used to treat people who have respiratory conditions such as:

Generally, nasal cannulas and face masks are used to treat patients with respiratory disorders including:

i) Asthma
ii) Bronchopulmonary Dysplasia, or underdeveloped lungs in newborns
iii) Chronic Obstructive Pulmonary Disease (COPD)
iv) Cystic Fibrosis
v) Pneumonia
vi) Sleep Apnea

Result :

Identification, types, use / application /administration of needles. syringes, catheters, IV set, urine bag, RYLE's tube, urine pots, colostomy bags and oxygen masks was demonstrated.