SEARO Regional Health Papers No. 18

A MANUAL ON INFECTION CONTROL IN HEALTH FACILITIES

WORLD HEALTH ORGANIZATION
REGIONAL OFFICE FOR SOUTH-EAST ASIA
NEW DELHI, 1988

The SEARO Regional Health Papers are intended to make generally available material that for economic, technical or other reasons cannot be included in SEARO's regular publications programme and would otherwise receive only limited distribution.

ISBN 92 9022 187 9

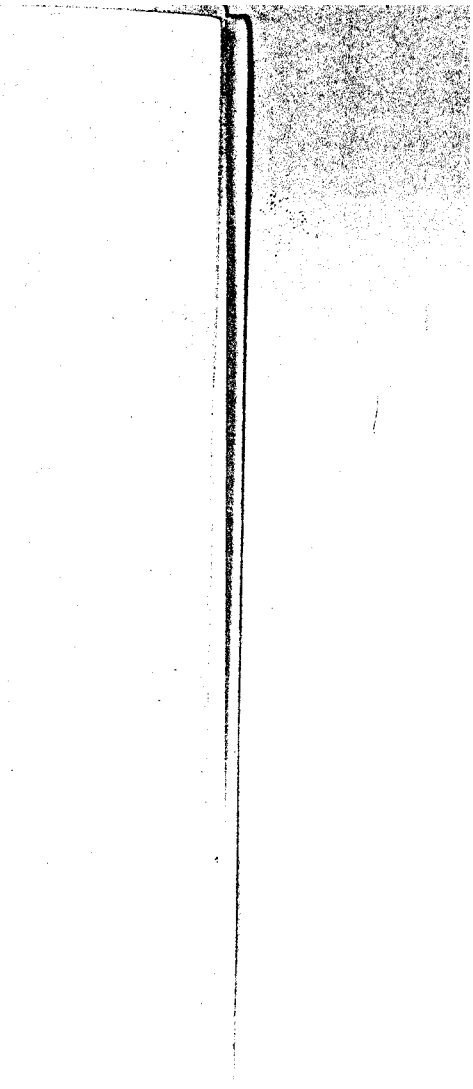
Printed in India

PREFACE

The recognition of the importance of infection control in health care facilities in Nepal and the need to provide information and guidelines to those working in the field have led to the development of the Manual on Infection Control in Health Facility.

The purpose of this manual is to serve as an educational tool and valuable resource guide on infection control concepts and procedures to all hospital and health care workers. The manual should enable the health workers to understand the importance of infection control and the methods to achieve this in health facilities.

Ms Rukmini Charan Shrestha, Chief of the Division of Nursing, Government of Nepal, Ministry of Health, Kathmandu, along with the members of her staff and consultants from the World Health Organization and the Dooley Foundation/INTERMED have contributed to the preparation of this manual. Illustrations are by Mr Mohan Shrestha, Department of Public Health Education, Nepal.



CONTENTS

Chapter 1

WHY HOSPITAL ENVIRONMENTAL CONTROL?

The health facility environment includes people, equipment and supplies, and the actual hospital or clinic building (walls, floors, etc.). Cleanliness and tidiness of the hospital environment promotes physical and mental comfort to the patient. In addition, proper care of the hospital environment can prevent hospital-acquired infections.

A hospital-acquired (nosocomial) infection is one which was not present or incubating at the time of admission to the hospital or when visiting the clinic. Infection may also occur in patients, employees and visitors who often have close contact with patients (Figure 1.1). Hospital-acquired infections include post-operative wound infections, such as gastrointestinal or skin infections.

Infection occurs in hospitals and health posts because patients who visit these facilities have often many different illness; while in the hospital or health post they may transmit their organisms through contact. Factors which make a person more likely to get infected are certain ages (newborns, elderly), underlying diseases (diabetes, malnourishment), drug therapy (antibiotics, steriods), and invasive procedures (surgery, catheterization). The use of "barrier techniques" may help to prevent the spread of infection by reducing the risk of transmission. Barrier techniques include handwashing, wearing mask or gown, isolation, cleaning, disinfection, and sterilization.

The infection control procedures in this manual are designed to prevent the spread of infection within the hospitals and the health posts (Figure 1.2) in the following ways:

(1) by reducing the spread of infection from person to person (patient to patient, patient to staff).

(2) by eliminating the spread of infection from equipment and instruments to people, and

(3) by providing a standard for the routine cleaning of surface and the work environment.

Figure 1.1

CYCLE OF INFECTION IN HOSPITAL

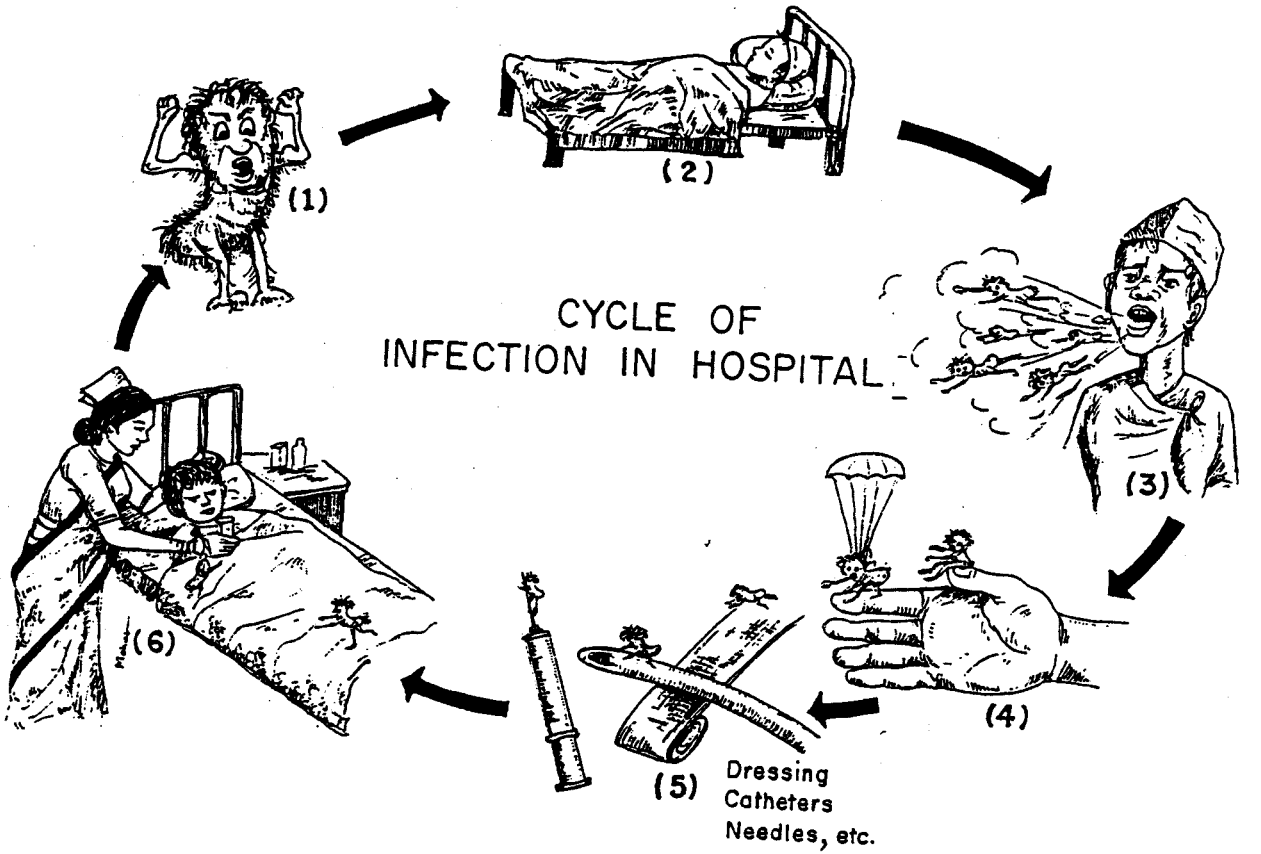
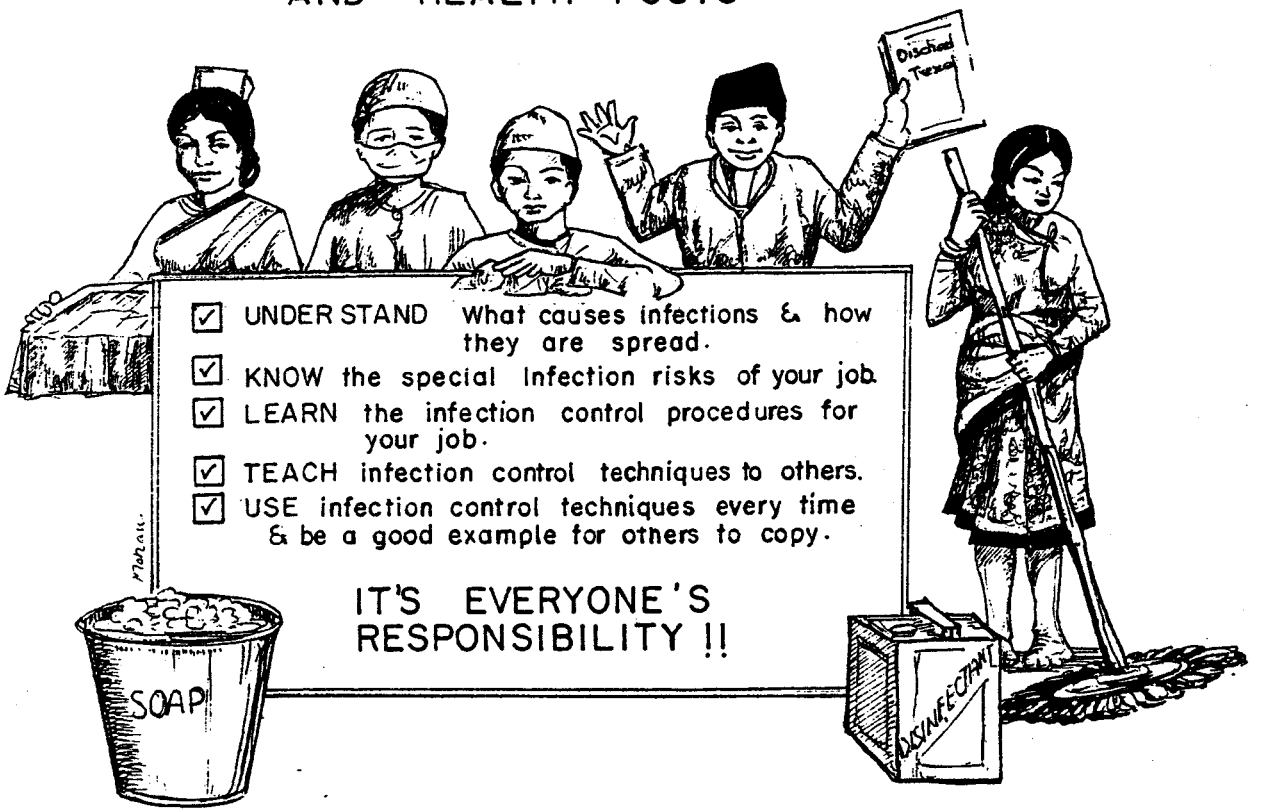


Figure 1.2

STOP THE SPREAD OF INFECTION IN OUR HOSPITAL AND HEALTH POSTS



Chapter 2

HANDWASHING

PURPOSE

Handwashing prevents the spread of pathogens to non-contaminated areas by removing most of the micro-organisms carried on the hands of hospital personnel.

Frequent contact with patients' blood, tissue and body fluids by the hands of the personnel provide a means of transmission from patient to patient and from patient to personnel.

> **Handwashing is the single most important procedure for the prevention of hospital-acquired infections.**

Items used for handwashing are soap, water, and antimicrobials which are available in most hospitals and health posts. Handwashing **with soap** helps to loosen dirt and micro-organisms, enabling them to be removed temporarily from the hands when rinsed. The antimicrobials control to kill or inhibit micro-organisms on the skin (skin cannot be sterilized). In addition to the antimicrobial agent, friction from a brush or vigorously rubbing the hands together removes dirt and micro-organisms.

AGENTS

Soap, without germicidal ingredient (this is the best to use for routine handwashing.)

Examples:

- bar soap (always place the bar soap on a rack to allow water to drain)
- powdered soap
- liquid soap (always clean the container when empty and refill with fresh soap).

Antimicrobial Soap

Use for handwashing in "high risk" areas, such as the operation theatre, intensive care unit, labour and delivery unit, nursery or isolation areas.

Examples:

- Chlorhexidine (Savlon, Hibicleans)
- Iodophor (Betadine)

- Alcohol (may be used when other soaps and water are not available). You may use a few drops of glycerine to protect your hands from dryness caused by the alcohol.

FACILITIES

Handwashing facilities	- Should be located where they can be used easily and frequently.
Running water	- **Use running water** because bacteria can multiply in standing water, even when a germicidal agent is used.
Washing agent	- Use plain or antimicrobial soap, depending on the purpose.
Clean dry towel	- **Always dry your hands.** For drying hands, individual or paper towels are best. Wet and dirty towels can spread germs.

Important Points to Remember

Always wash your hands:

- before starting work
- when they are visibly dirty
- after going to the toilet
- after blowing your nose
- after handling garbage
- before eating or drinking
- after finishing work.

Always wash your hands when doing special procedures, such as the following:

- before doing aseptic procedures, such as an intravenous or urinary catheter insertion
- before and after touching dressings or wounds
- after handling dirty equipment (urinals, bed-pans) or dressings and linens
- before and after collecting specimens
- after contact with mucous membranes, blood or body fluids, secretions or excretions
- before and after contact with patients in intensive care or isolation.

ROUTINE HANDWASHING PROCEDURE

PURPOSE

To remove as many micro-organisms as possible from the hands in order to prevent spread of infection to patients and staff.

EQUIPMENT

Soap:

- bar soap
- powdered soap
- liquid soap

Running water
Clean dry towel

PROCEDURE

(1) Remove all your jewellery.

(2) Wet your hands and forearms with warm water.

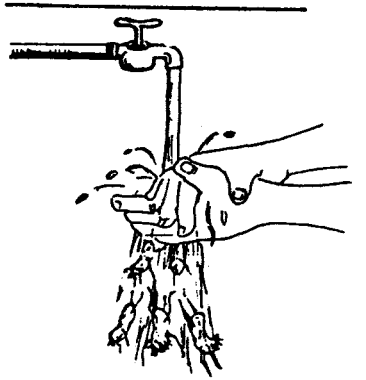
(3) Lather hands well, vigorously scrub the fingers, palms, back of the hands, forearms, and wrists for 20 seconds. (When you start on duty always wash for 60 seconds.)

(4) Rinse thoroughly with running water.

(5) Dry carefully by dabbing with clean dry towel (see Figure 2.1).

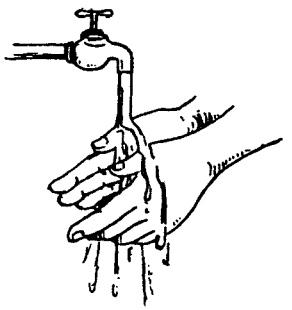
Figure 2.1

HAND WASHING

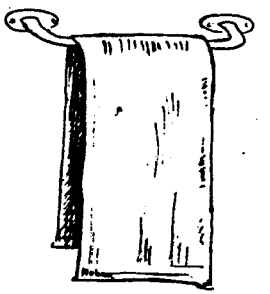


"Our Hero"

1 Vigorously wash hands with soap & running water; pay special attention to finger nails and spaces between fingers.



2. Rinse throughly under running water.



3. Dry carefully with clean dry towel.

HAND SCRUB BEFORE SURGICAL PROCEDURE

PURPOSE

To remove as many micro-organisms as possible from the hands in order to prevent the spread of infection to the surgical wound.

EQUIPMENT

Antimicrobial agents (Figure 2.4).

Examples:

- Chlorhexidine (Savlon, Hibicleans)
- Iodophor (Betadine)
- 70% Alcohol
- Hexachlorophene (Phisohex)

Running water
Sterile towel

PROCEDURES

Antimicrobial hand scrub (Figure 2.2).

(1) Remove all your jewellery.

(2) Wet your hands and forearms with warm water.

(3) Use antimicrobial soap, water, and a brush to scrub your hands, nails and arms to the elbow.

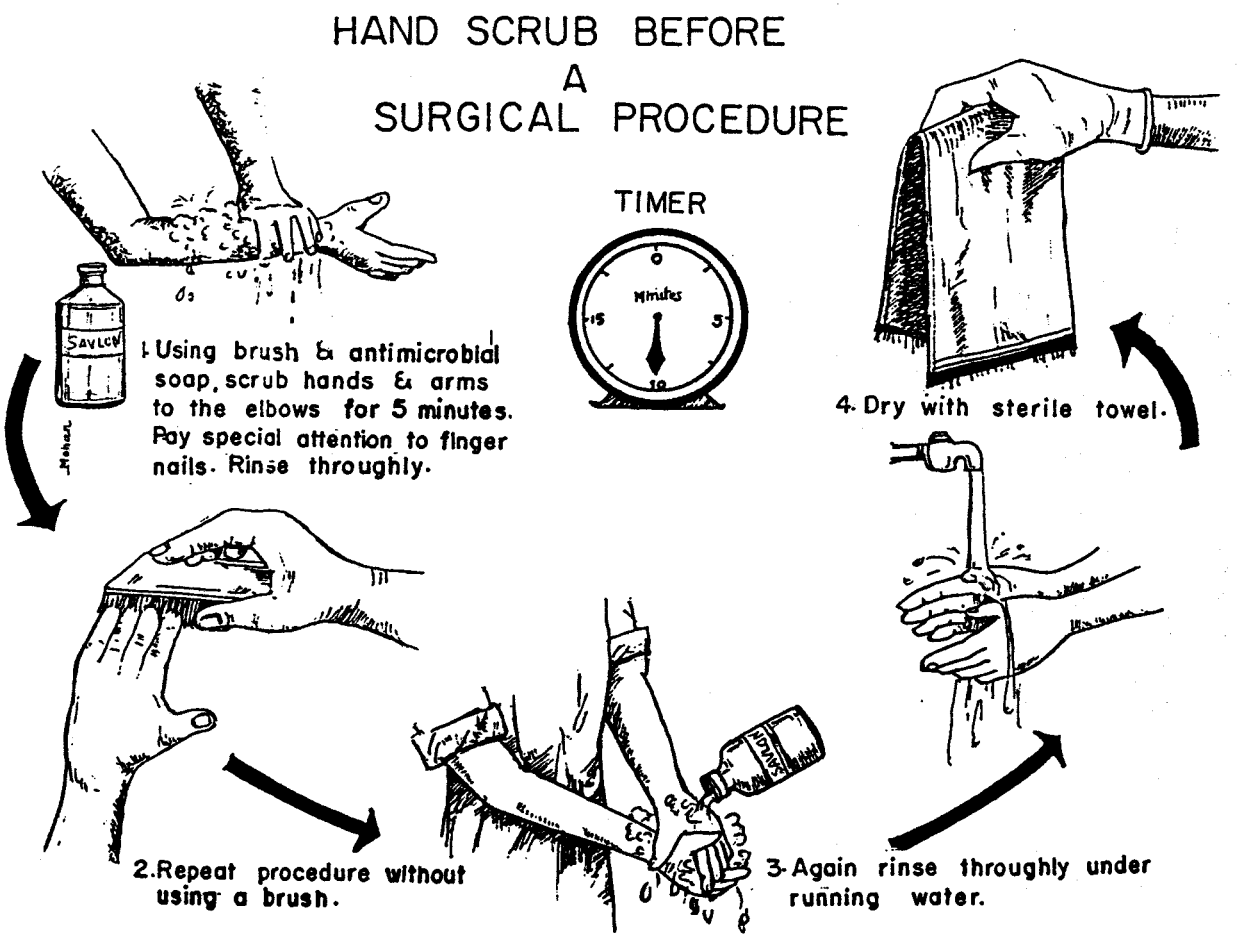
(4) Rinse your hands thoroughly in running water.

(5) Repeat the same procedure without using the brush.

(6) Again rinse your hands thoroughly in running water.

(7) Dry your hands with a sterile towel.

Figure 2.2


HAND SCRUB BEFORE
A
SURGICAL PROCEDURE
TIMER
Minutes
15
5
10
1. Using brush & antimicrobial soap, scrub hands & arms to the elbows for 5 minutes. Pay special attention to finger nails. Rinse throughly.
2. Repeat procedure without using a brush.
3. Again rinse throughly under running water.
4. Dry with sterile towel.

Alcohol hand scrub:

(1) Remove all your jewellery.

(2) Wet your hands and forearms with warm water.

(3) Use soap, water and a brush to scrub your hands, nails, and arms to the elbow.

(4) Rinse your hands thoroughly in running water.

(5) Repeat the same procedure, this time without using a brush.

(6) Again rinse your hands in running water.

(7) Pour 5 cc of alcohol into your cupped hands and vigorously rub over hands and wrists until dry.

(8) Repeat alcohol application (see Figure 2.3).

Note: Scrub before every surgical procedure. Take 5-10 minutes before the first procedure of the day and at least 5 minutes before every procedure thereafter.

Figure 2.3

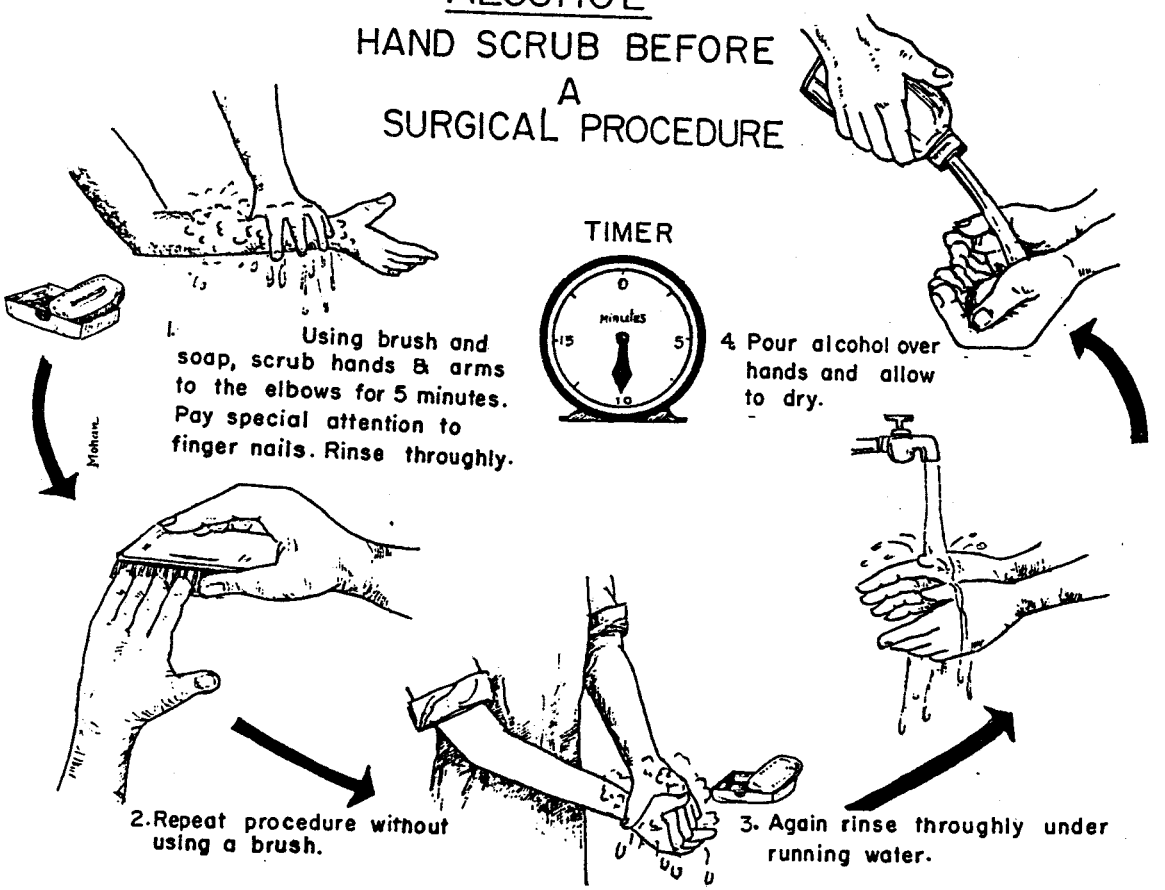

ALCOHOL
HAND SCRUB BEFORE
A
SURGICAL PROCEDURE
TIMER
1. Using brush and soap, scrub hands & arms to the elbows for 5 minutes. Pay special attention to finger nails. Rinse throughly.
2. Repeat procedure without using a brush.
3. Again rinse throughly under running water.
4. Pour alcohol over hands and allow to dry.

Figure 2.4

COMMON ANTIMICROBIAL (SKIN CLEANING AGENTS) USED FOR HANDWASHING, PRE-OPERATIVE SURGICAL SCRUB, AND SKIN WOUND CLEANER AND THEIR USES

Agent	Purpose	Consideration
Chlorhexidine gluconate ("Hibiclens") ("Savlon" - Chlorhexidine and cetrimicide)	Kills: Gram-positives Gram-negatives viruses	1. Rinse thoroughly with water after use. 2. Use sparingly. Agent does not produce much soap foam. 3. This product forms a chemical protection in the skin which kills bacteria. This chemical protection increases with repeated use.
Alcohol (70% ethyl or isopropyl) ("Spirits")	Kills: Gram-positives Gram-negatives M. tuberculosis	1. Very drying to handle. 2. Allow to dry on skin. Take at least 30 seconds prior to needle insertion. 3. There is not a continuous killing action after evaporation. 4. Should not be used as a single agent for pre-operative surgical scrub.
Iodine (tincture or aqueous "Lugolis")	Kills: Gram-positives Gram-negatives M. tuberculosis spores	1. DO NOT use if iodine allergy exists as severe burning may occur. 2. Rinse treated area with alcohol for about 30 seconds after applying agent; this will prevent irritation or burning. 3. Expose treated area to air; to prevent burning, do not bandage. 4. May stain skin and will stain fabric.

Agent	Purpose	Consideration
Hexachlorophene (*Phisohex)	Kills: Gram-positives	1. As a surgical scrub effectiveness increases with frequent use, a physical barrier which kills gram-positive organisms is created over the hands. This barrier is maintained with constant use (e.g., use agent each time you scrub). 2. Alcohol and iodine break down this barrier. Contact with either of these products makes hexachlorophene ineffective. 3. Do not use in nursery, except in case of Staphylococcus outbreak because it may lead to serious neurotic effects in premature infants and newborns. 4. May irritate skin; always rinse skin thoroughly with water after use.
Iodophor (providine - iodine) (Betadine) (Povadyne Cleaning bar) (Acu-Dyne skin cleanser)	Kills: Gram-positives Gram-negatives Some viruses	1. For handwashing, rinse well with water. Avoid frequent use as agent may irritate skin. 2. If iodine is allergic, do not use as severe burning may occur. 3. If using Betadine solution for a skin preparation, rinsing reduces effectiveness. If you must see vein, remove agent with alcohol.

KEY: Gram-positive organisms include Streptococcus, Staphylococcus, and others
Gram-negative organisms include Escherichia coli, Klebsiella, Pseudomonas, and others
Spores include Clostridium (gangrene and tetanus) and others
Viruses include measles, mumps, chickenpox, hepatitis, and others

Chapter 3

SKIN PREPARATION FOR SURGICAL AND NON-SURGICAL PROCEDURES

I. Surgical - Preparation of Operative Site

PURPOSE

To remove as many micro-organisms as possible from the surgical site, including patient's normal flora in order to reduce wound infections.

EQUIPMENT

Antimicrobial agent: (Figure 2.4)

Example:
- 1% Tincture of Iodine
- Iodophor (Betadine)
- Tincture of Chlorhexidine (Hibitane)

Sponges
Forceps

Note: Alcohol as a single agent is adequate only for such minor procedures as the insertion of an intravenous device.

PROCEDURE

(1) Use a sponge to apply the antimicrobial for a specified time.

(2) Discard the sponge.

(3) Scrub from the centre (incision line) to the outside of the operative site. Savlon is most effective for this purpose.

(4) Wipe off the lather with sterile sponges.

(5) Apply one of the above antimicrobial solutions on an area large enough to include the entire incision, then continue applying the solution to the surrounding area making a site large enough for the surgeon to work on during the operation without contacting unprepared skin.

Note: If tincture of iodine is used, allow it to dry completely, then remove with 70% alcohol to prevent burning.

II. Non-Surgical Skin Preparation

A. Preparation of Intramuscular Injection Site

PURPOSE

To remove as many micro-organisms as possible from the patient's skin, including patient's own normal flora in order to prevent abscess at the injection site.

EQUIPMENT

70% Alcohol
Cotton swabs

PROCEDURE

(1) Clean the skin with an alcohol swab using a circular motion starting at a central spot and moving towards the outer zone.

(2) Allow time for alcohol to dry on the skin prior to injection. This takes at least 30 seconds.

B. Preparation of Intravenous Injection Site

PURPOSE

To remove as many micro-organisms as possible from the patient's skin, including patient's own normal flora, in order to prevent abscess at the injection site.

EQUIPMENT

Antiseptic agent

- 1-2% Tincture of Iodine
- Iodophor (Betadine)
- 70% Alcohol

Cotton swabs

PROCEDURE

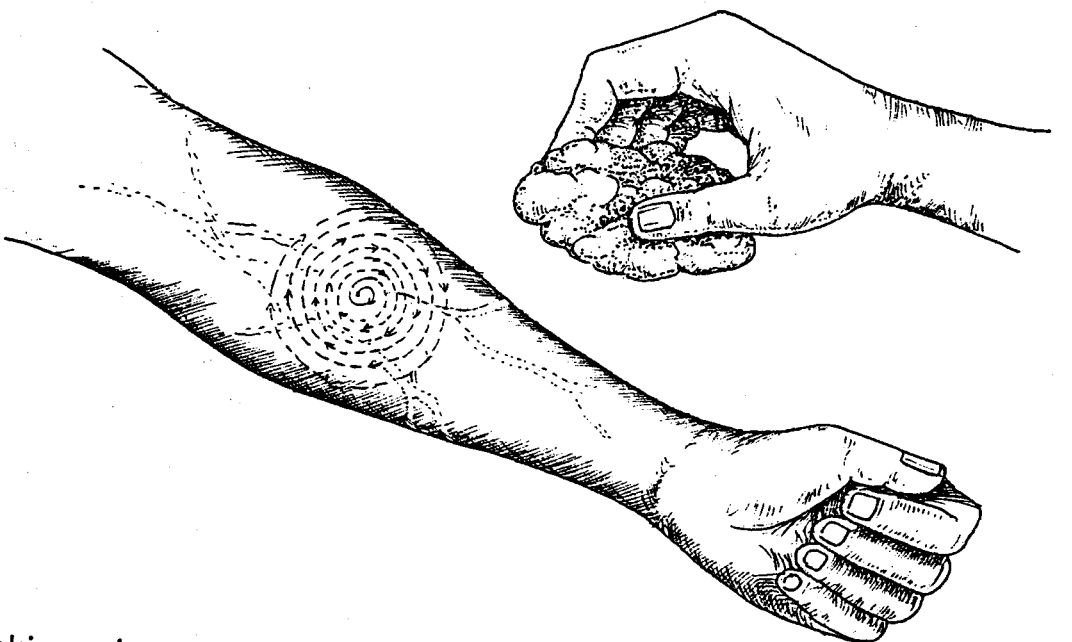
(1) Apply the antiseptic agent liberally in a circular motion starting from a central spot and move towards the outer zone (see Figure 3.1).

(2) Allow the antiseptic to dry on the skin. This takes at least 30 seconds prior to needle insertion.

(3) Clean your fingers with alcohol before touching the site if a vein palpitation is necessary.

Figure 3.1

PREPARATION OF INTRAVENOUS SITE



Clean skin using a circular motion starting from a central spot and moving toward an outer zone with an alcohol cotton swab.

Chapter 4

DRESSING TECHNIQUES

PURPOSE

To prevent infection by keeping the wound clean, to promote healing, and to make the patient comfortable.

GENERAL GUIDELINES

(1) Determine the need for dressing by the type of wound.

(a) Abrasions tend to heal without dressing.

(b) Lacerations may require dressing depending on the extent.

(c) Punctures may need dressing, also depending on the extent.

(d) Surgical incision may need dressing depending on whether there is drainage from the wound.

(2) Keep all articles that come in contact with a wound sterile, by handling with sterile gloves or sterile forceps to prevent contamination of the wound.

(3) Prevent spread of infection by:

(a) separating contaminated articles from clean articles;

(b) placing soiled dressings in a covered garbage container for disposal by incineration;

(c) washing your hands before and after the care of the wound.

(4) Keep wounds clean and dry to promote healing.

(5) Hold dressings that require frequent change in place with binders. This will protect the skin from irritation by elimination of the use of adhesive tape.

EQUIPMENT

Sterile dressing set - forceps, tweezers, small bowl, dressing material:

Sterile gauze
Sterile gloves
Covered garbage container
Tape/binder

I. Procedures for Various Types of Dressings

A. Dry Dressings for Clean Wounds

PROCEDURE

(1) Wash your hands.

(2) Explain the procedure to the patient and make him feel comfortable.

(3) Collect all the necessary sterile items.

(4) Remove the dressing and discard into a covered garbage container.

(5) Wash your hands.

(6) Clean the skin around the wound, if indicated or ordered by the physician.

(7) Check the wound for redness or irritation, and if present report the symptoms to the doctor.

(8) Apply sterile,dry dressing and secure with tape, gauge, or binders.

(9) Wash your hands.

B. Dry Dressings for Dirty Wounds

PROCEDURE

(1) Explain the procedure to the patient.

(2) Prepare a clean dry work area.

(3) Wash your hands.

(4) Collect all necessary clean and dry sterile items for changing the dressing.

(5) Remove cloth or dressing with hand or clean forceps and discard into covered garbage container.

(6) Wash your hands or rub with alcohol and air dry.

(7) Pour cleaning or antiseptic solution into a sterile bowl.

(8) Clean the skin around the wound with soap and water.

(9) Clean the wound with a solution using a cotton swab for each downward stroke.

(10) Apply a dry dressing with sterile gloves and sterile forceps, then secure with tape, gauze, or binders.

Chapter 5

CLEANING, DISINFECTION, AND STERILIZATION OF EQUIPMENT

Equipment can easily become a reservoir for micro-organisms that can contaminate hospital patients and staff. The purpose of this chapter is to provide guidelines to reduce the spread of micro-organisms through supplies and equipment used for patient care. These guidelines should be applied in every situation where disinfected or sterilized equipment is required.

Disinfection is a process that kills most disease-producing organisms, while **sterilization** is a process that kills all disease-producing organisms.

Important general infection guidelines to remember are:

- Infection may occur at any body site when medical supplies or equipment are contaminated.
- Clean equipment is necessary for effective disinfection and sterilization.
- Soiled items must always be kept separated from clean and sterile areas. This prevents cross-contamination.

Guidelines for Cleaning of Soiled Equipment

Routine cleaning of soiled equipment

PURPOSE

Cleaning, which is the most important step in the process of disinfection and sterilization, is the removal of all visible dust, soil and foreign material. Without proper cleaning, disinfection and sterilization cannot be achieved. Soil remaining on the equipment will protect the microbes from contact with the cleaning agents (disinfectants, sterilants) and inactivate the cleaning agent.

EQUIPMENT

Soap or detergent (no germicidal agent needed)
Cold and warm water
Brush

PROCEDURE

(1) Completely disassemble all items.

(2) Follow directions for proper dilutions of soap or detergent.

(3) Soak instruments in cold water for five minutes.

(4) Using warm water, soap and brush, completely remove all blood, tissue, food and other residue, paying special attention to small spaces and teeth of clamps or hemostats.

(5) Thoroughly rinse with water, as soap may interfere with the disinfection or sterilization process (Figure 5.1).

Methods of Disinfection

PURPOSE

Disinfection is done in order to kill, or inhibit the growth of micro-organisms on inanimate objects. Disinfection is usually accomplished with liquid although boiling is also effective. Disinfection is done for items that touch mucous membranes (respiratory equipment), items that cannot be autoclaved (laparoscopes), and equipment that does not need to be sterile (bedpans).

In order to be effective, the disinfectant chosen must:

(1) kill or inhibit the undesirable micro-organisms (see Figure 5.2, column C)

(2) not be harmful to the equipment on which it is used (see Figure 5.2, column D)

(3) be used only on clean, rinsed instruments, because protein material and soap will inhibit a disinfectant

(4) be used in the proper dilution (too much or too little disinfectant in water will not kill micro-organisms).

EQUIPMENT

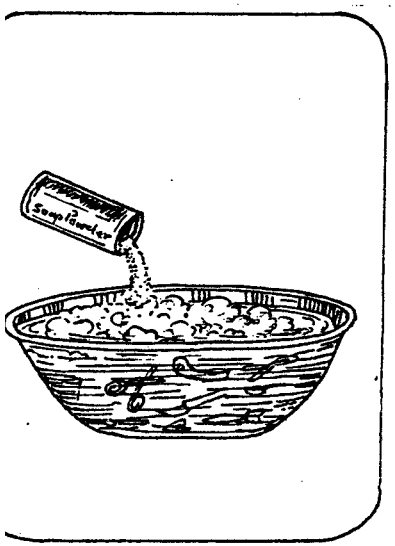
Disinfectant solution (Figure 5.2)

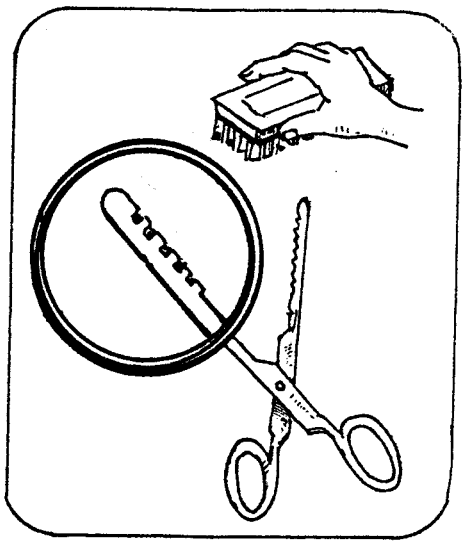
Example:
- 1-2% Phenol
- 70% Alcohol
- 0.5-1% Chlorine bleach for virus

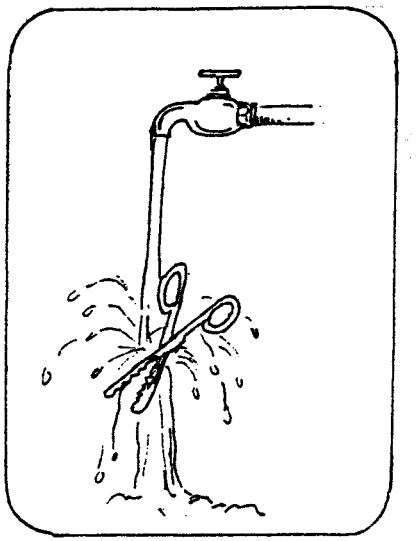
Plastic bucket or container for soaking.

Figure 5.1

CLEANING







ompletely remove blood, ssue, etc. with soap & old water. Soaking may elp.	2. Using a fine bristled brush, remove all material caught in small spaces.	3. Rinse thoroughly with water.

Figure 5.2

COMMON DISINFECTANTS AND THEIR USES ON INANIMATE OBJECTS ONLY

Agent (A)	Time (B)	Purpose (C)	Considerations (D)
Alcohol 70-90% ("Spirits")	10 minutes	Kills: gram-positives, gram-negatives, M. tuberculosis	1. Dries and irritates skin. 2. May dry, crack or discolor rubber or plastic articles. 3. Use disinfected object immediately because alcohol evaporates quickly and has no lasting effect.
Cetrimide ("Urclicide")	10 minutes	Inhibits: gram-positives, some gram-negatives. Used only for equipment that may come in contact with food (refrigerator) or newborn infants (incubator)	1. NOT effective for routine disinfection due to low-level killing action. 2. Use only where all other disinfectants may be toxic. 3. Rinse thoroughly with sterile water or water that has been boiled for 30 minutes.
Hypochlorite - chlorine bleach 0.5-1.0% (3 tablespoons of powdered bleach in 1 litre of water)	30 minutes	Kills: gram-negatives, M.tuberculosis, spores, Hepatitis virus, some gram-negatives. Used for patient equipment (bed-pans, thermometers) and housekeeping chores. Good for items used by hepatitis patients	1. Wear gloves to avoid skin irritation. 2. Don't use on items having close contact with mucous membranes; will cause burning. 3. Avoid using on metal as it may be corrosive. 4. Prepare fresh solution each time and use it immediately. Discard the remains, because killing action rapidly becomes inactivated. 5. Rinse thoroughly with sterile water or water boiled for 30 minutes.

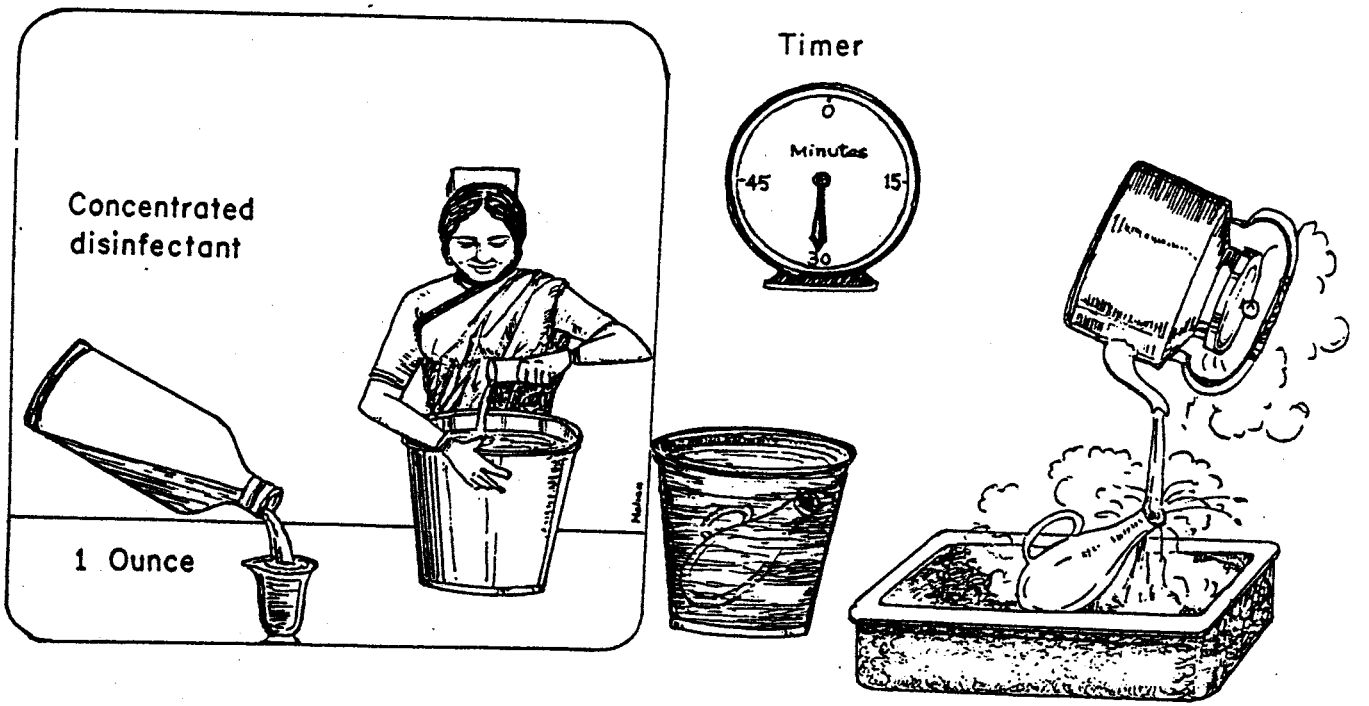
Agent (A)	Time (B)	Purpose (C)	Considerations (D)
Formaldehyde	30 minutes	Kills: gram-positives, gram-negatives, M. tuberculosis, spores, Hepatitis virus	1. Wear gloves to avoid skin irritation. 2. Don't use on items having contact with mucous membranes; will cause burning. 3. Releases pungent odour; use in ventilated area. 4. Rinse thoroughly with sterile water or water boiled for 30 minutes.
Formalin (40% formaldehyde; 60% water)	30 minutes	Kills: gram-positives, gram-negatives, M. tuberculosis	1. Wear gloves to avoid skin irritation. 2. Rinse thoroughly with sterile water or water that has been boiled for 30 minutes. 3. Releases pungent odour that may irritate eyes, nose, and throat; use in a well-ventilated room.
Glutaraldehyde ("Cidex") (sporicidin)	5 minutes	Kills: gram-positives, gram-negatives, M. tuberculosis, spores, viruses Used for respiratory equipment, lensed instruments, plastic tubing and dialysis equipment	1. Wear gloves to avoid skin irritation. 2. Store in a cool place. 3. Use in well-ventilated rooms. 4. 15 minutes of immersion will not kill spores; immerse for 10 hours to ensure killing of spores. 5. Rinse thoroughly with sterile water or water that has been boiled for 30 minutes.

Agent (A)	Time (B)	Purpose (C)	Considerations (D)
Idophor (povidone iodine - iodine/ detergent combination ("Betadine")	30 minutes	Kills: gram-positives, gram-negatives Some viruses	1. Avoid using on metal articles as it may cause discoloration and corrosion 2. Rinse thoroughly with sterile water or water that has been boiled for 30 minutes.
Phenol 1-2%("Phenyl") ("Lysol") ("Dettol")	30 minutes	Kills:gram-positives, gram-negatives M.tuberculosis Some viruses Used for patient-care items (bed-pans, sputum mugs, etc.)	1. Wear gloves to avoid skin irritation 2. If used on articles that have close contact with mucous membranes, rinse thoroughly to prevent burning. 3. Reactivates when exposed to moisture. 4. For rubber tubing and catheters, use 3% solution. Must be thoroughly rinsed. 5. Rinse thoroughly with sterile water or water that has been boiled for 30 minutes. 6. Dettol is inactivated by organic materials (e.g., blood, mucous, etc.) and should not be used routinely in hospitals.

*KEY: gram-positive organisms include Streptococcus, Staphylococcus, and others.
Gram-negative organisms include E. coli, Klebsiella, Pseudomonas, and others.
Spores include Clostridium (gangrene and tetanus) and others. Viruses include measles, mumps, chickenpox, hepatitis and others.

Figure 5.3

DISINFECTION



1. Be sure disinfectant is properly diluted.

2. Soak item for 10-30 minutes

3. Rinse thoroughly with sterile or boiling water.

PROCEDURE

(1) Follow the manufacturer's directions for proper dilution of the disinfectant.

(2) Choose the appropriate disinfectant solution (Figure 5.2).

(3) Completely immerse the clean items in disinfectant solution.

(4) When chemicals are used, items must be soaked for 10-30 minutes (Figure 5.3).

(5) If boiling is to be done, water must be at full boil for 30 minutes in order to kill or inhibit the growth of most micro-organisms (Figure 5.3).

(6) Rinse the items thoroughly in sterile or boiled water.

(7) Items soaked in alcohol do not need to be rinsed.

(8) Dry the items with a sterile towel or allow them to air dry.

(9) Use the sterile items immediately or store in dust-free containers.

Guidelines for Sterilization of Equipment

PURPOSE

Sterilization is done in order to **completely destroy all living organisms.** Sterilization is used for all objects that are introduced directly into the blood stream or into other normally sterile areas of the body and for certain objects entering non-sterile body cavities, such as feeding bottles and nipples, or dressings.

PROCEDURE

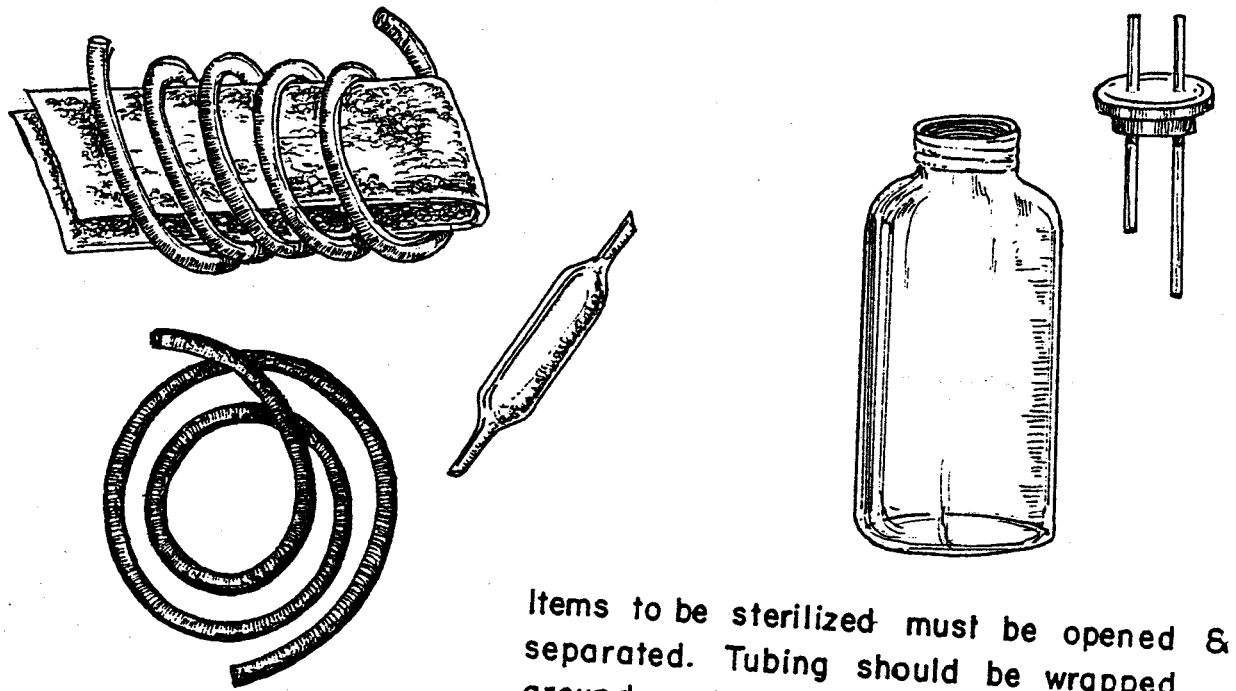
(1) Clean very carefully all items prior to sterilization (Figure 5.1).

(2) Open and separate all items before processing. For example:

(a) Wrap tubing around a towel or cloth and coil gently (Figure 5.4).

Figure 5.4

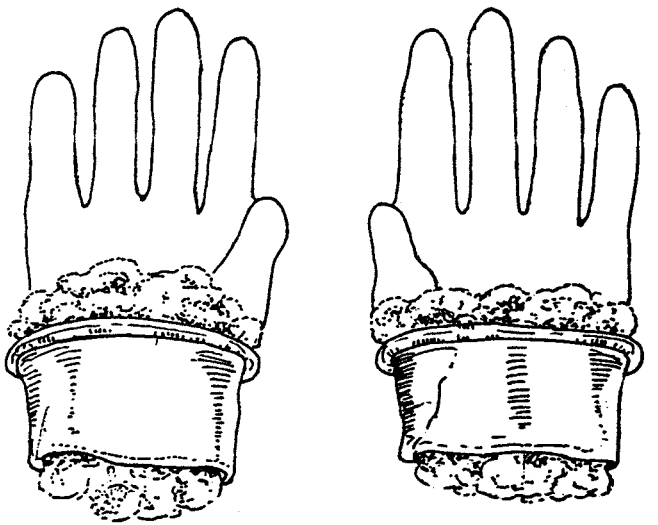
CHEST SUCTION SET



Items to be sterilized must be opened & separated. Tubing should be wrapped around a towel or cloth or gently coiled to permit steam penetration.

Figure 5.5

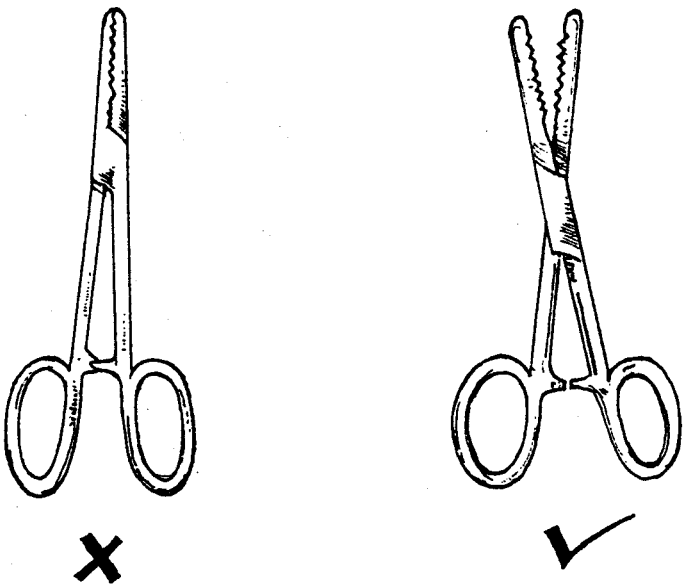
GLOVES



Gauze inside glove and under fold allows steam to penetrate.

Figure 5.6

HINGED INSTRUMENTS



Hinged instruments must be open for sterilization.

Figure 5.7

TESTS FOR STERILITY

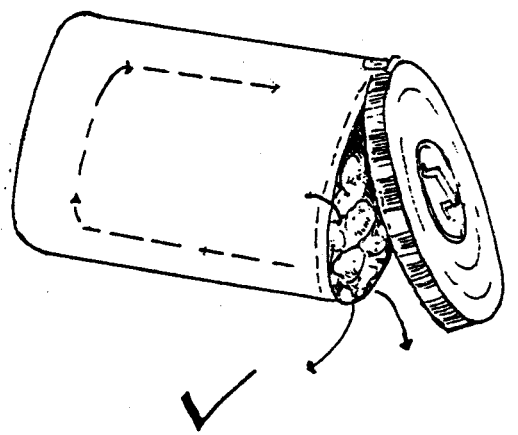
Method		Appropriate Indicator		
Agent	Means	Physical	Chemical	Bacteriological
Dry Heat	Flame	Must be RED HOT	None	Monthly check: Mix of spores-producing and non-spore-producing bacteria
	Oven	Thermometer	Daily check: heat-sensitive dyes	
Humid Heat (method of choice for hospitals)	Autoclaves or pressure-cooker (steam under pressure)	Recorder of: pressure, temperature time (duration)	Daily check: Heat-sensitive dyes for steam saturation	Bi-weekly check: spore test (Bacillus stearothermophilus)

NOTE: BOILING DOES NOT CONSTITUTE STERILIZATION. IT DOES NOT KILL SPORES (TETANUS) OR MANY VIRUSES!

Figure 5.8

STERILIZATION DRUMS

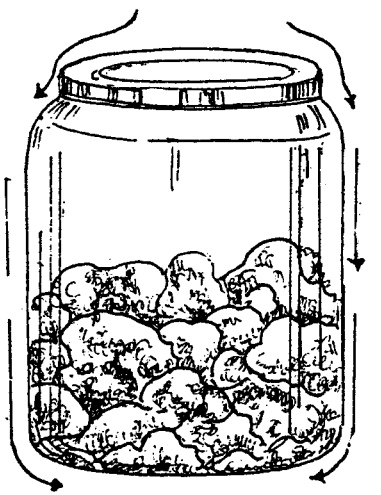
(Arrows indicate steam)



✓

To sterilize, tilt drum & open lid.

Air drains out & is replaced by steam.



X

Do not place drum upright in sterilizer

Even with cover removed, air cannot escape.

Steam can't enter container. Dressings are not sterilized.

Figure 5.9

STEAM STERILIZATION - TEMPERATURE, PRESSURE, AND TIME REQUIREMENTS FOR DIFFERENT ITEMS

Items	Temperature	Pressure In Pounds	Time in minutes (Start timing after correct temperature and pressure have been reached)
Linen (drapes, sponges, masks, gowns, etc.)	120°C (250°F)	15	30
Rubber items (gloves catheters, rubber tubing, etc.)	120°C (250°F)	15	15
Wrapped surgical instruments	120°C (250°F)	15	30
Unwrapped surgical instruments	120°C (250°F)	15	15
Glassware (syringes, bottles, etc.)	120°C (250°F)	15	15

(b) Place gauze inside gloves and under the cuffs (Figure 5.5).

(c) Open all hinged instruments (forceps, clamps, etc.) for proper penetration (Figure 5.6).

(3) Choose the appropriate method of sterilization.

(4) If autoclaving is the method of sterilization, wrap items with cloth, paper or other appropriate material and insert proper indicator to show that the article is sterile (Figure 5.7).

(5) When drums are used in the sterilizer, tilt the drums and open the lids to allow air to drain out and to be replaced by steam (Figure 5.8).

(6) Sterilize the items for the designated amount of time. Do not remove the batch before the drying cycle is complete (Figure 5.9).

(7) Remove the items from the sterilizer.

(8) Allow them to cool completely before storage.

(9) Use immediately or store in sterile storage area.

PROCEDURE FOR CLEANING, PACKING AND STERILIZING GLOVES

Cleaning Equipment

- Sodium bicarbonate
- Water
- Brush
- Gauze or proper inserts
- Surgical drums

PROCEDURE

New Gloves

(1) Wash with soap and water in 5% solution of sodium bicarbonate for 15 minutes to remove any particles that are present in the gloves.

(2) Rinse thoroughly with water.

(3) Check for holes by inflating glove with hand, holding under water, and looking for air bubbles.

Used Gloves

(1) Wash under cold water before removing from the hands. This step should be performed with caution in order to prevent splattering and to avoid the release of aerosols into the environment.

(2) If a brush is used to loosen blood debris, hands should be brushed while immersed under water.

(3) Do not soak gloves in water for a long time. They will absorb water and become sticky.

(4) Wash gloves with soap and water, making sure to clean both inside and outside.

(5) Rinse with water.

(6) Test the gloves for any holes by inflating them by hand, holding under water, and looking for air bubbles.

(7) Dry the gloves. Reverse the gloves and make sure that they are dry both inside and outside.

Packing

- Sort according to size, type (right, left).
- Place paper or muslin (gauze) inserts within palm and cuff of gloves to allow air removal and steam intake (gauze can be reused) (see Figure 5.5).
- Place each pair of gloves and a tiny paper pack of powder (if needed) in a cloth glove and tie it loosely. **DO NOT** use powder for the Norplant procedure.
- Hazards of powder

  (a) The use of powder as a lubricant for gloves and hands in the operation theatre should be abolished because:

  - powder enters the incision, delays healing, and can cause infection (powder granulomata),
  - bacteria attach themselves to the powder particles and disseminate in the air and in the wound.

  (b) If powder must be used, it should be distributed **SPARINGLY**;

  (c) **NEVER** put powder on the outside of gloves.

Sterilization

- Place glove packages in a surgical drum - packs should be upright and parallel to each other;
- Autoclave at 15 pounds pressure and 120°C (250°F) for 15 minutes;
- Release the pressure;
- After sterilization, and, if possible, hold gloves in temporary storage for a minimum of 24 hours, preferably 48 hours before distribution for general use. This prevents sticking.

Storage

- Store clean and packaged gloves where they will be protected from excessive light (natural and artificial), and excessive heat.

Storage of Disinfected and Sterilized Equipment

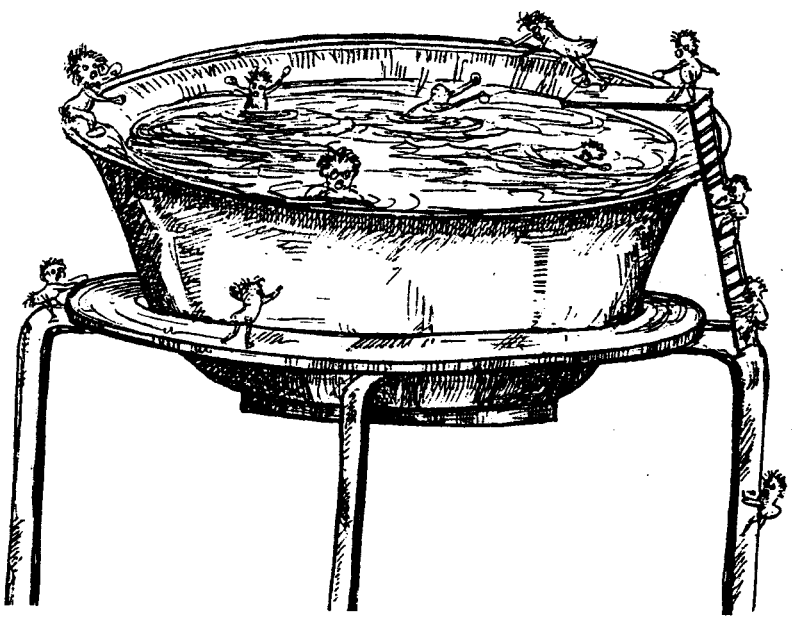
Proper storage of disinfected and sterilized equipment is just as important as the disinfection or sterilization process itself.

Disinfected items must be DRY when stored. These include suction and oxygen humidification bottles. Micro-organisms, especially Pseudomonas, will multiply in standing water even when a disinfectant has been added (see Figure 5.10). If equipment, such as thermometers, must be stored in a disinfectant between uses, the disinfectant should be changed frequently (at least every 24 hours). Disinfected items should be stored in cabinets or covered with paper or plastic to protect them from dust.

Sterile packs should be stored no longer than the safe storage items listed below. An item must be considered contaminated when the package is torn or damaged, when the package is wet, or when the expiry date has passed (Figure 5.11).

Figure 5.10

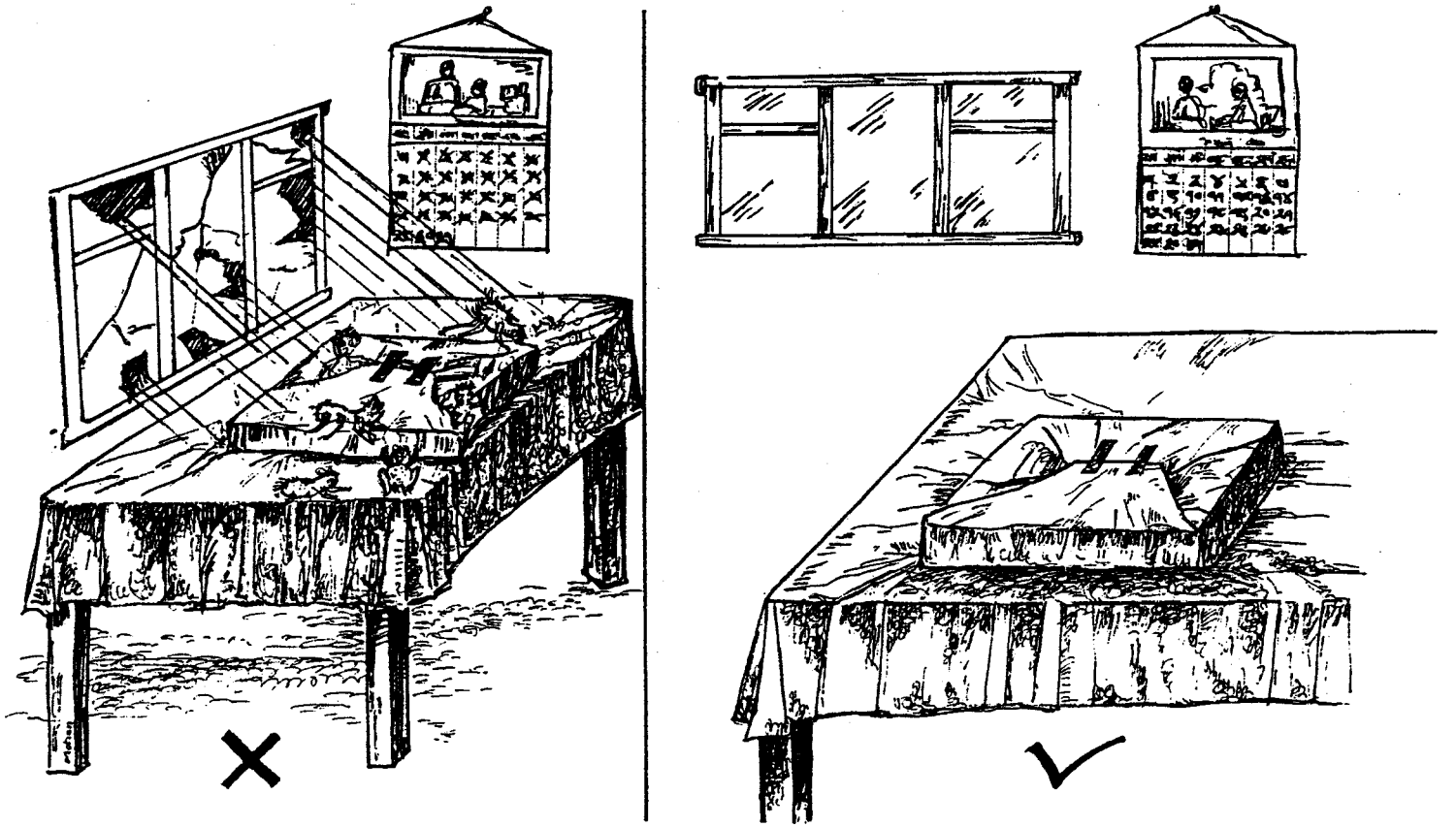
STANDING WATER IS UNSAFE



Standing water - Micro - organisms "love" standing water even when a disinfectant has been added.

Figure 5.11

STORAGE OF STERILE PACKS



Do not use packs that are torn, wet, or when expiration date is exceeded.

LENGTH OF SAFE STORAGE FOR STERILE PACKS

Wrapping	Duration of Sterility	
	Closed Cabinet	Open Shelves
Single-wrapped muslin (2 layers)	1 week	2 days
Double-wrapped muslin (each 2 layers)	7 weeks	3 weeks
Paper	3 days	3 days
Single muslin (2 layers sealed in 3 mil polyethylene)	9 months	9 months
Heat-sealed, transparent plastic and paper pouch	1 year	1 year

GENERAL GUIDELINES FOR THE OPERATION OF A CENTRAL STERILE SUPPLY DEPARTMENT

The Central Sterile Supply Department (CSSD) is the best place for maintaining, preparing, sterilizing, and issuing supplies and equipment for the hospital. However, these procedures may also be done in other areas of the hospital, such as the operation theatre, laboratory, or delivery room.

The advantages of having an established CSSD are:

- sterilization techniques can be easily controlled and standardized because the work is under constant supervision by one individual who devotes her entire time to this activity. The designated supervisor is responsible for the management and organization of the CSSD.

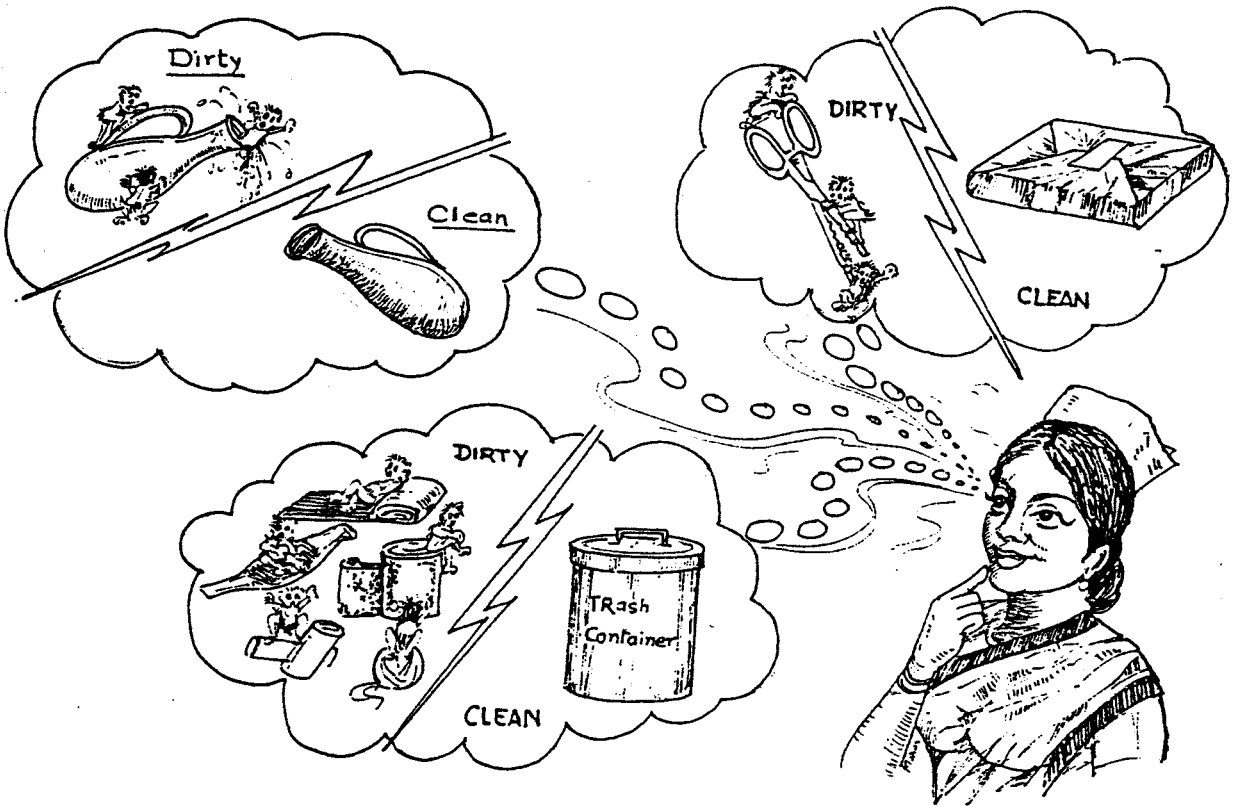
- the efficient and proper handling of equipment and supplies prevent damage and repair costs. Duplication of equipment is not necessary.

GUIDELINES FOR HOSPITAL CENTRAL STERILE SUPPLY DEPARTMENT (CSSD)

The Central Sterile Supply Department work flow patterns should operate so that soiled and contaminated objects are kept separate from those that are clean. Work areas should be divided by barrier walls (see Figures 5.12 and 5.13).

Figure 5.12

Always keep clean and dirty items separate from each other. Build real or imaginary barriers.



Organize CSSD into the following areas:

(1) Receiving and Clean-up Area - receive, decontaminate, and wash all soiled objects in this area. There should be two sinks, one for soaking and one for washing.

(2) Clean Work Area - disinfect, sterilize and pack clean items in this area.

(3) Clean Equipment Storage Area - store clean equipment in this area. Sterile Supply Department employees should also enter CSSD through this area.

(4) Sterile Storage Area - store all processed equipment in this area. To prevent contamination of sterile supplies, this area should not be adjacent to the receiving area. Processed equipment should be dispensed directly from the Sterile Storage Area (see Figure 5.13).

GUIDELINES FOR STERILIZATION AND USE OF NEEDLES AND SYRINGES

(Adapted from Volume 2, Syringes, Needles, and Sterilization, Immunization in Practice, WHO; EPI/PAW/84/72).

USE A NEWLY STERILIZED SYRINGE AND NEEDLE FOR EACH INJECTION

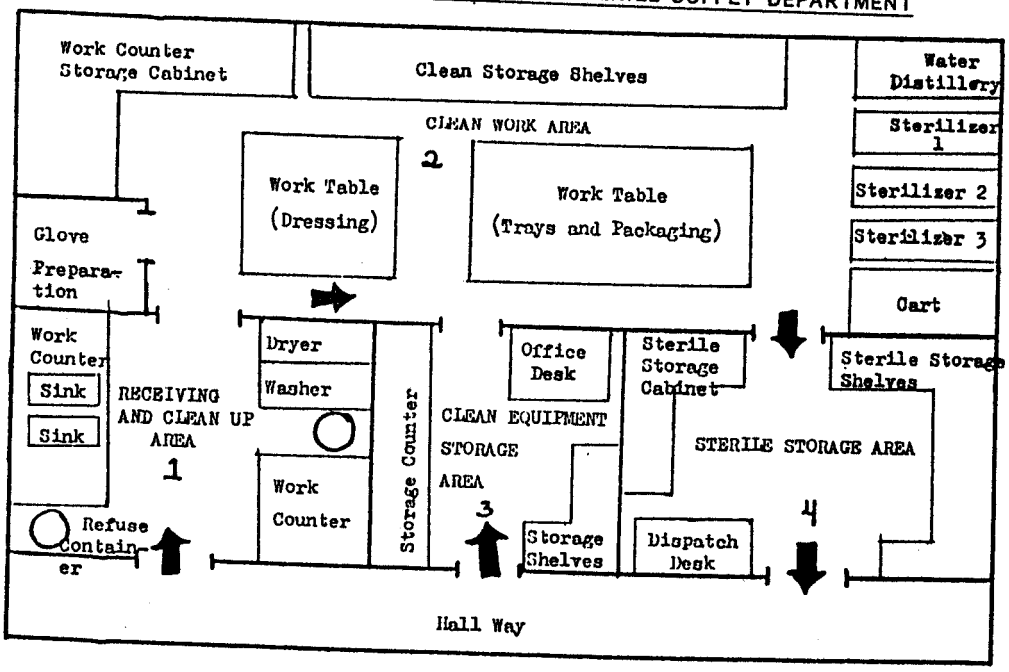
As soon as you touch a sterile instrument, or put it down on the table, or use it, micro-organisms begin to collect on it.

Then it is **unsterile** or contaminated.

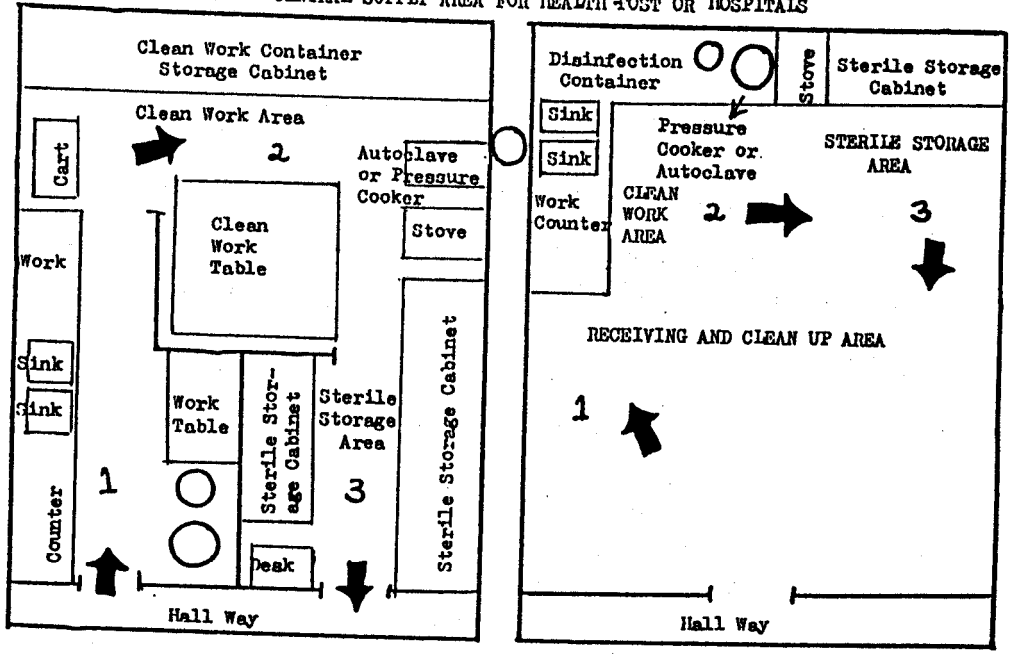
Instruments become contaminated quickly when you use them, so you must handle syringes and needles carefully to keep them sterile.

Figure 5.13

FLOOR PLAN - CONVENTIONAL CENTRAL STERILE SUPPLY DEPARTMENT



FLOOR PLAN - CENTRAL SUPPLY AREA FOR HEALTH POST OR HOSPITALS



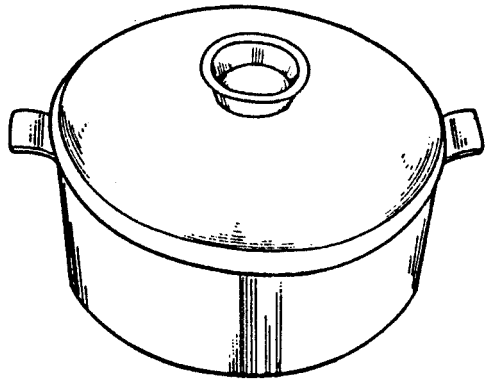
HANDLING SYRINGES: KEEPING THEM STERILE WHILE YOU USE THEM

1. Keep Instruments in a Sterile Covered Container

Often you can use the same container in which you sterilized the instruments.

Figure 5.14

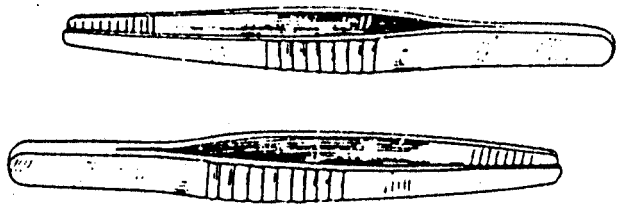
STERILE COVERED CONTAINER



2. USE STERILE FORCEPS TO PICK UP INSTRUMENTS

Figure 5.15

FORCEPS



Keep the forceps in their own sterilized pot.

Figure 5.16

FORCEPS IN STERILIZED POT

Do not put your hand into the container of instruments - you will contaminate all of them.

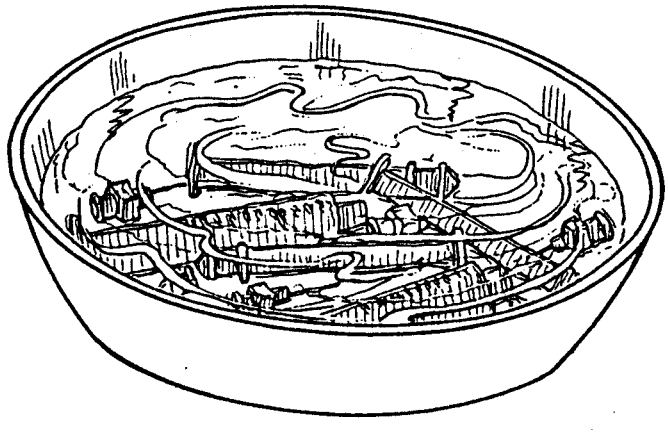
How to Clean Instruments After Use

Try to clean all the instruments immediately after use.

Then it is much easier to remove all the dirt, before it sticks hard.

Figure 5.17

USED SYRINGES AND NEEDLES SOAKING
IN A CONTAINER OF WATER



Soaking the Instruments After Use

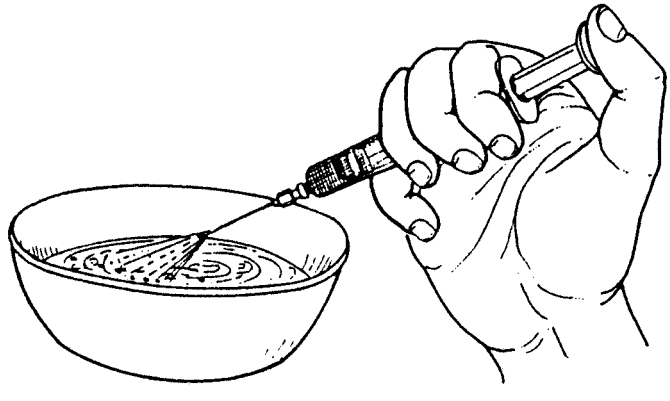
- Keep a separate container for used instruments.
- Put some clean water into it.
- Immediately after you use a syringe, separate the needle, barrel and plunger.
- Put them into the container of water to soak.
- The water prevents the dirt from sticking, and it is easier to clean the instruments later.
- Do not put too many syringes into one bowl of water together, because they break more easily, and soaking does not work so well.

Cleaning Syringes

- Put them to soak in clean water until you are ready.
- Draw clean water into the syringe and then empty it out (as if you were injecting). Do that several times (Figure 5.18).
- Take the plungers out of the barrels and wash each part carefully.
- Wipe the inside of the syringe with a cloth to remove the dirt (Use a bottle brush if you have one).

Figure 5.18

WASHING A SYRINGE AND NEEDLE THOROUGHLY WITH WATER



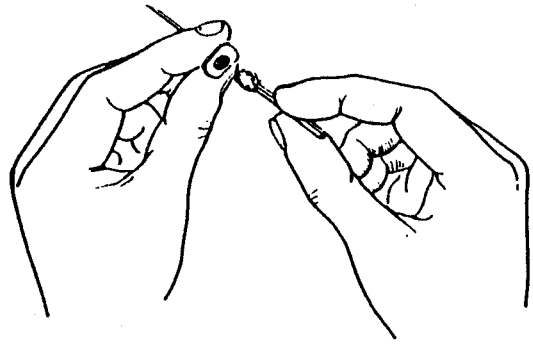
Cleaning Needles

(1) Take a clean 10 ml syringe, fill it with clean water, and wash through each needle several times, as if you were injecting.

(2) Put some cotton wool at the end of a matchstick, and wipe the inside of each needle adaptor (Figure 5.19).

Figure 5.19

WIPING A NEEDLE ADAPTOR WITH COTTON WOOL



EQUIPMENT FOR STERILIZATION

There are several kinds of sterilizing equipment. Figure 5.20 shows some equipment that can be used where there is no electricity or electric sterilizer. The principles are the same as with other methods and with different equipment.

(1) A kerosene stove. Use small gas burners, or even charcoal stoves, if these are more easily available.

(2) A spare, full bottle of kerosene or other fuel.

(3) Matches.

(4) A container with lid to boil the instruments in a simple round cooking pan; you may have a square sterilizing pan. You may need two pans.

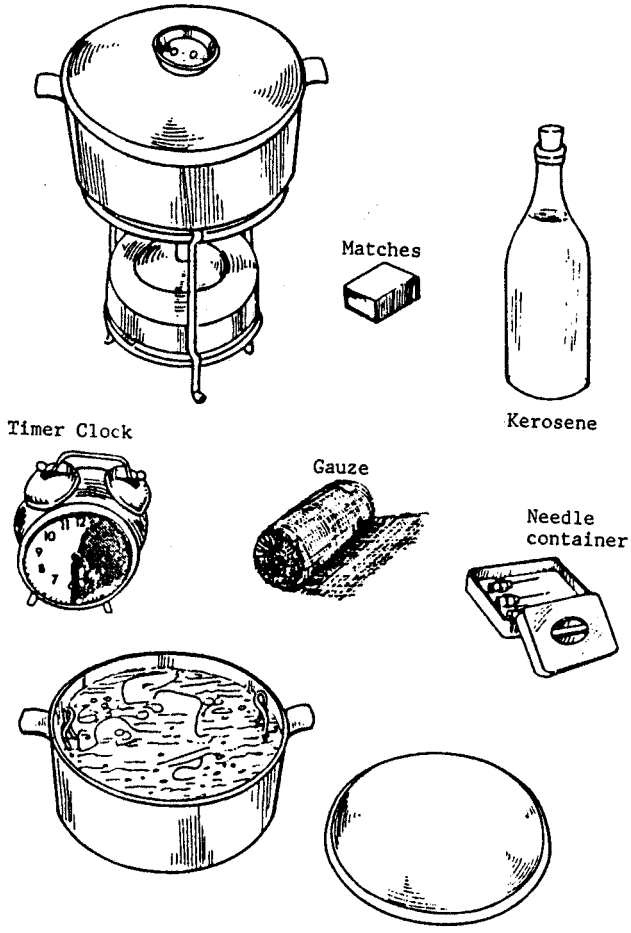
(5) A small container with cover for needles (it can be round or square).

(6) A timer clock.

(7) Gauze or any other cotton cloth, (polyester, nylon, etc., are not suitable).

Figure 5.20

EQUIPMENT FOR STERILIZATION



PACKING OF INSTRUMENTS FOR STERILIZATION

Packing Syringes

(1) Take the plungers out of the barrels.

(2) It you use glass syringes, wrap them in gauze or cotton cloth. This is to prevent breaking during transport.

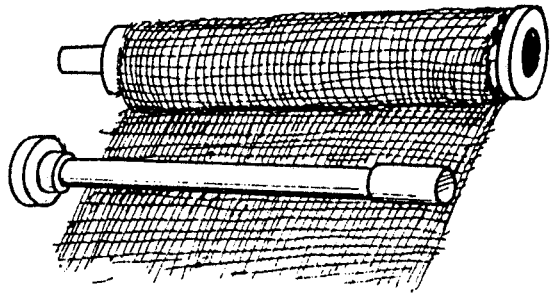
- Cut pieces of gauze 20 cm long from a roll.
- Use one piece of gauze for each syringe.

- Check that the barrel and plunger are a pair, and that they fit each other.

- Wrap the gauze first round the plunger, and then round the barrel, so that there is gauze between and around each pair.

Figure 5.21

WRAPPING THE BARREL AND PLUNGER IN GAUZE OR COTTON

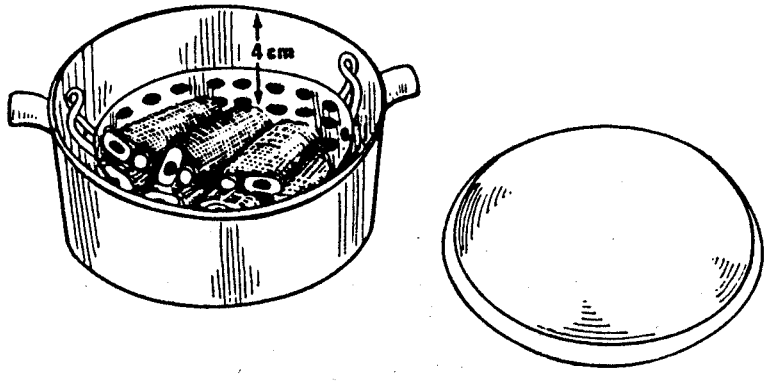


(3) Pack the barrels and plungers, or the gauze-wrapped glass syringes neatly into the pan for sterilization.

You must leave at least 4 cm between the top of the syringes and the top of the pan.

Figure 5.22

PACKING SYRINGES INTO A STERILIZER



Putting in the Needles

(1) Put needles into their containers
<u>or</u>: stick them into a piece of gauze or cotton. It is difficult to stick BCG needles into gauze, because they are so short.

(2) Leave the container of needles OPEN, and put it on top of the syringes. Put the cover beside it.

Figure 5.23

NEEDLES IN CONTAINER

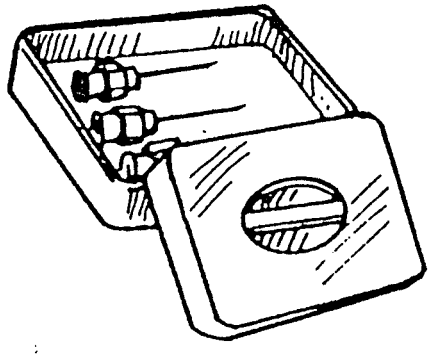
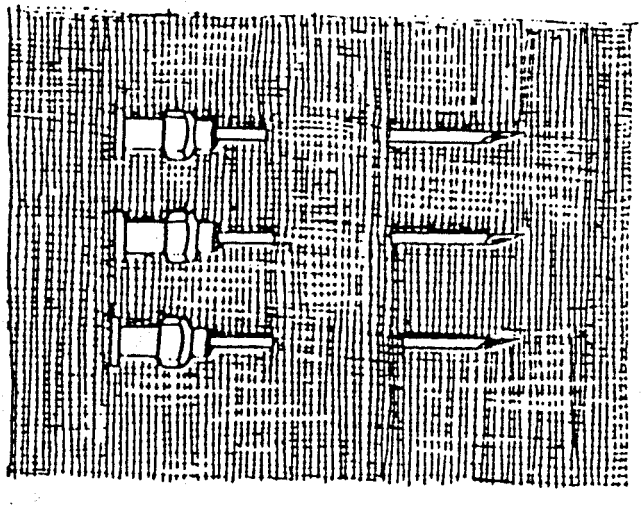


Figure 5.24

NEEDLES STUCK INTO GAUZE OR COTTON



Putting in Forceps

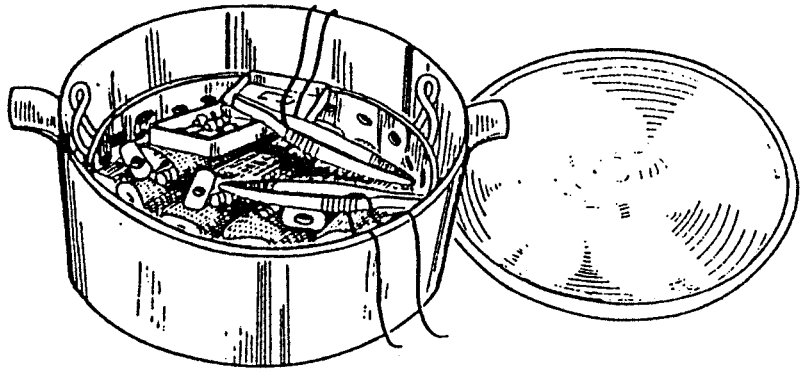
(1) Put two pairs of forceps into the sterilizer.

(2) Put a loop of string round each pair of forceps, to help you to lift them out of the pan after sterilization.

(3) Put them ON TOP of the other instruments.

Figure 5.25

TWO PAIRS OF FORCEPS IN THE STERILIZING PAN



Sterilizing: How to Boil the Instruments

(1) Pour water into the pan so that there is at least 2 cm of water above and covering the instruments.

(2) Light the stove.

(3) Put the cover on to the pan.

(4) Put the pan on the stove, and heat the water until it boils.

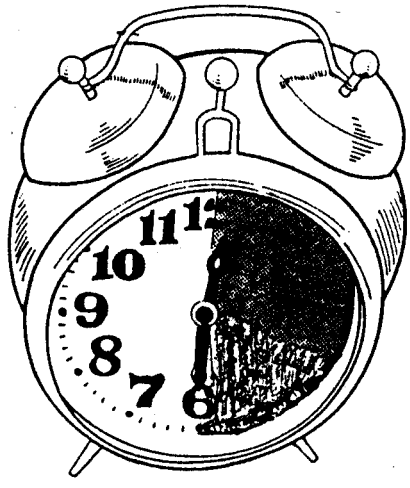
(5) Boil the instruments for at least 30 minutes. Time the boiling with the clock.

(6) **Do not** put anything more into the sterilizer after it starts to boil because:

- If you put a cold glass syringe straight into boiling water it can break.
- You must start to count the 30 minutes all over again - or the instruments will not be properly sterilized.

Figure 5.26

TIMER CLOCK SHOWING 30 MINUTES



REMEMBER

BOIL INSTRUMENTS FOR AT LEAST 30 MINUTES. PUT FORCEPS ON TOP OF INSTRUMENTS TO STERILIZE. DO NOT ADD THINGS AFTER BOILING STARTS

Chapter 6

MICROBIOLOGIC CULTURING OF THE ENVIRONMENT AND OF PERSONNEL IN THE HOSPITAL

PURPOSE

The purpose of microbiologic culturing is to determine what, if any, micro-organisms are present in the environment and on the personnel. Routine microbiologic sampling is appropriate in specific instances where the data is necessary without regard to the nosocomial infection rate in the hospital. Areas where routine monitoring is indicated are sterilizers and infant formulae prepared in the hospital. The only reasons for other environment samplings are education, epidemiologic purposes and evaluation of a new cleaning method. Problems faced with interpretation of unnecessary culturing are that it may generate inconclusive data, is expensive, may require special laboratory procedures, and may result in the implementation of unnecessary procedures.

ROUTINE MONITORING BY CULTURE

(1) Monitor the steam sterilizer once a week using a live bacterial spore strip (Bacillus stearothermophilus).

(2) Send the tested live bacterial spore strip to the laboratory for analysis.

(3) Attach a chemical indicator to the outside of each package to show that it has gone through the sterilizing cycle.

(4) When spores are not killed by the sterilizing process, check the sterilizer for proper use and function. Repeat the spore strip test, and if the spore remains still positive, discontinue the use of the sterilizer until it has been serviced.

HEMODIALYSIS

(1) Monitor viable microbial counts at least monthly in water dialysis fluid.

(2) To sample water, collect one ml of water at a point where water enters the chamber for dialysate fluid.

(3) To sample dialysis fluid, collect one ml of the fluid at the termination of the dialysis treatment.

(4) The acceptable microbiological count for water is 100-200 per one ml and for the dialysis fluid is 1000-2000 per ml. When the microbiological count of water exceeds 200, check the water supply; when the microbiological count for the dialysate exceeds 2000, review the disinfection method of the machine.

INFANT FORMULAE

(1) Culture the hospital-prepared infant formulae on a monthly basis. Send one ml from a random batch to the laboratory.

(2) The acceptable organism count is 25 per ml. When the count exceeds that amount, check procedure technique.

REASONS FOR DOING CULTURING, OTHER THAN ROUTINE, ON THE ENVIRONMENT AND PERSONNEL

(1) To find the source of an epidemic or outbreak of infection within the hospital. Culture the environment and personnel when a number of hospital-acquired infections are associated with the same organisms, e.g., a single stain of Staphylococcus aureus traced to a certain hospital employee or Pseudomonas in standing water or solution used for patient care.

(2) To teach personnel about infection control. Use hand cultures before and after washing to demonstrate that handwashing is an important way to stop the spread of organisms within the hospital.

(3) To test a new change in the disinfection method. Culture the environment or equipment before and after cleaning and disinfection.

PROCEDURE FOR OBTAINING CULTURES FROM THE ENVIRONMENT AND THE PERSONNEL WHEN INVESTIGATING OUTBREAKS

EQUIPMENT

- Sterile cotton swab stick
- Nutrient broth or sterile saline
- Transport container

PROCEDURE

(1) Remove a sterile swab stick from the wrapper, being careful to keep your fingers away from the sterile cotton tip.

(2) If the surface to be cultured is dry, moisten the cotton tip with sterile nutrient broth or saline. If the surface is wet, use a dry swab to collect the specimen.

(3) Rub the swab gently or roll it over the area to be cultured.

(4) Place the swab into a transport media or nutrient broth or sterile saline, or place it back inside the sterile wrapper for transport.

(5) Send the specimen to the microbiology laboratory immediately.

NOTE: Use "Settle plates" to detect airborne bacteria. These plates do not give accurate count of airborne organisms, but are useful for teaching purposes. This is done by placing an open petri dish of nutrient or blood agar on the floor of the room to be tested. Place the lid beside the petri dish with the top-side down. Leave the plate in place for one half hour. Then place the lid on the dish, touching only the outer edges. Take the specimen immediately to the laboratory.

Chapter 7

HOUSEKEEPING SERVICES

INTRODUCTION

Proper housekeeping procedures in hospitals and health posts are important because they reduce the number of micro-organisms that come into contact with patients and staff, increase safety through prevention of falls, and provide an aesthetically pleasing environment.

Determine the cleaning method by the type of surface, the amount and kind of soil present, and the purpose of the area. An area without a large number of pathogenic micro-organisms can be cleaned with soap and water. Other areas with a large number of pathogenic micro-organisms (e.g., isolation areas, toilets, or latrines) need a disinfectant for cleaning. Disinfectants should also be used in areas where particularly susceptible patients are housed (operating theatre, nursery and intensive care units).

IMPORTANT POINTS TO REMEMBER IN HOUSEKEEPING

(1) Frictional cleaning (scrubbing) is the most important way to remove dirt and micro-organisms. Use frictional cleaning for all cleaning procedures.

(2) Improper cleaning spreads pathogenic micro-organisms. Do the following in order to avoid soiling clean areas in the process of cleaning dirty ones: (a) wash the cleaning cloths daily, (b) change solutions when obviously dirty, (c) use a separate cloth for cleaning contaminated areas, such as toilets, and (d) always wash from top to bottom.

(3) Dilute the disinfectants according to the instructions. **Too much** or **too little** disinfectant in water will not kill micro-organisms. Excepting for alcohol, antiseptic agents that are intended for use on the skin should not be used for surface cleaning (Figure 5.2).

(4) **Do not** carry out disinfectant **fogging** for control of microbial contamination of air and surfaces. Scrubbing of the entire area is more effective for infection control. In addition, fogging is expensive, time consuming and potentially toxic.

(5) Write routine schedules for all housekeeping personnel for more effective housekeeping practices (e.g., "Walls should be cleaned every Tuesday") (Figure 7.1).

Figure 7.1

ROUTINE CLEANING SCHEDULE

Item	Schedule	Equipment and Supplies needed
Wash Basin	Daily and as needed	Soap Solution* Water
Bathrooms	Every two hours and as needed	Soap Solution* Water Bucket Cloth**
Bedside Lockers Beds	Daily - damp wipe Fridays - thoroughly clean	Soap Solution* Water Bucket Cloth**
Buckets, bedpans, urinals, sputum mugs, and feeding cups	Daily and as needed	Soap Solution* Phenol Water
Cleaning Cloths	Daily	Soap Solution* Water Bucket
Dustbin	Daily and as needed	Vim Powder Water Cloth**
Fans	Thursdays and as needed	Damp Cloth

*Soap Solution: 1/3 soap, 1/3 bleach, 1/3 soda combination.
**Always use a different cloth when cleaning floors, bathrooms, and patient items

Item	Schedule	Equipment and Supplies needed
Floors	4-5 times daily Morning Duty 7 am - wet-mopping 11 am - sweeping and wet-mopping Afternoon Duty 2 pm - sweeping and wet-mopping Night Duty 8 pm - sweeping and wet-mopping 6 am - sweeping	Broom/Dust mop Soap Solution* Water Bucket Cloth**
Kidney Dish	Daily and as needed	Soap solution* Phenol Water
Wall dusting and removal of cobwebs	Sundays and as needed	Long-handled broom
Wall - wet-mopping Stands for intravenous sets, oxygen tanks, and bedscreens	Mondays and as needed	Soap Solution* Water Bucket Cloth**
Window Nets	Tuesdays and as needed	Broom
Window Glass	Wednesdays and needed	Razor blade Cloth** Water Bucket

*Soap Solution: 1/3 soap, 1/3 bleach, 1/3 soda combination.
**Always use a different cloth when cleaning floors, bathrooms, and patient items

HOW TO CLEAN THE FLOORS, TOILETS, HOSPITAL COMPOUND, BUILDING AND FURNITURE

PURPOSE

To protect the patients and staff from nosocomial infection by reducing the number of pathogens from the hospital environment.

Sweeping the Floor

EQUIPMENT

- Broom, dust pan
- Mop, cloth
- Bucket
- Soap, water
- Brush
- Scouring powder, such as Vim or ash

PROCEDURE

(1) Floors should be swept and dry mopped four times a day, or as necessary. Protect patients and staff from inhaling air-borne dust particles by sprinkling water on the floor prior to dry-mopping.

(2) Wet-mop the floors four times a day with soap and water and remove all surface dirt.

(3) Using a brush and scouring powder, clean thoroughly the corners and baseboards.

Toilet Cleaning

EQUIPMENT

Mixture of 1/3 bleach powder, 1/3 soap powder, and 1/3 washing soda:

- Cloth
- Brush
- Bucket
- Hard broom
- Sanifresh - for stubborn stains

USE ONLY IN THE TOILET AREA

PROCEDURE

(1) Clean the toilet areas, thoroughly at least four times a day, and as necessary.

(2) Sweep the toilet area to remove all garbage.

(3) Sprinkle the bleach/soap mixture over floor and pan area.

(4) Use a wet cloth or brush and bucket of water, scrub the entire area thoroughly.

(5) Rinse the area thoroughly with water to remove all dirt and bleach/soap mixture.

(6) Use sanifresh in pan, whenever necessary, to remove the stain.

(7) Wash the cloth, brush, and bucket after use and dry them in the sun.

(8) Wash your hands with soap and water.

Hospital Compound

EQUIPMENT

- Broom, dustpan
- Scoop and cardboard
- Bucket and/or wheel barrow
- Dustbin and/or garbage pail

USE ONLY OUTSIDE

PROCEDURE

(1) Pick up all the trash at least twice a day and place it in a dustbin. Avoid touching the trash with your hands by using a stick with a nail (Figure 7.2).

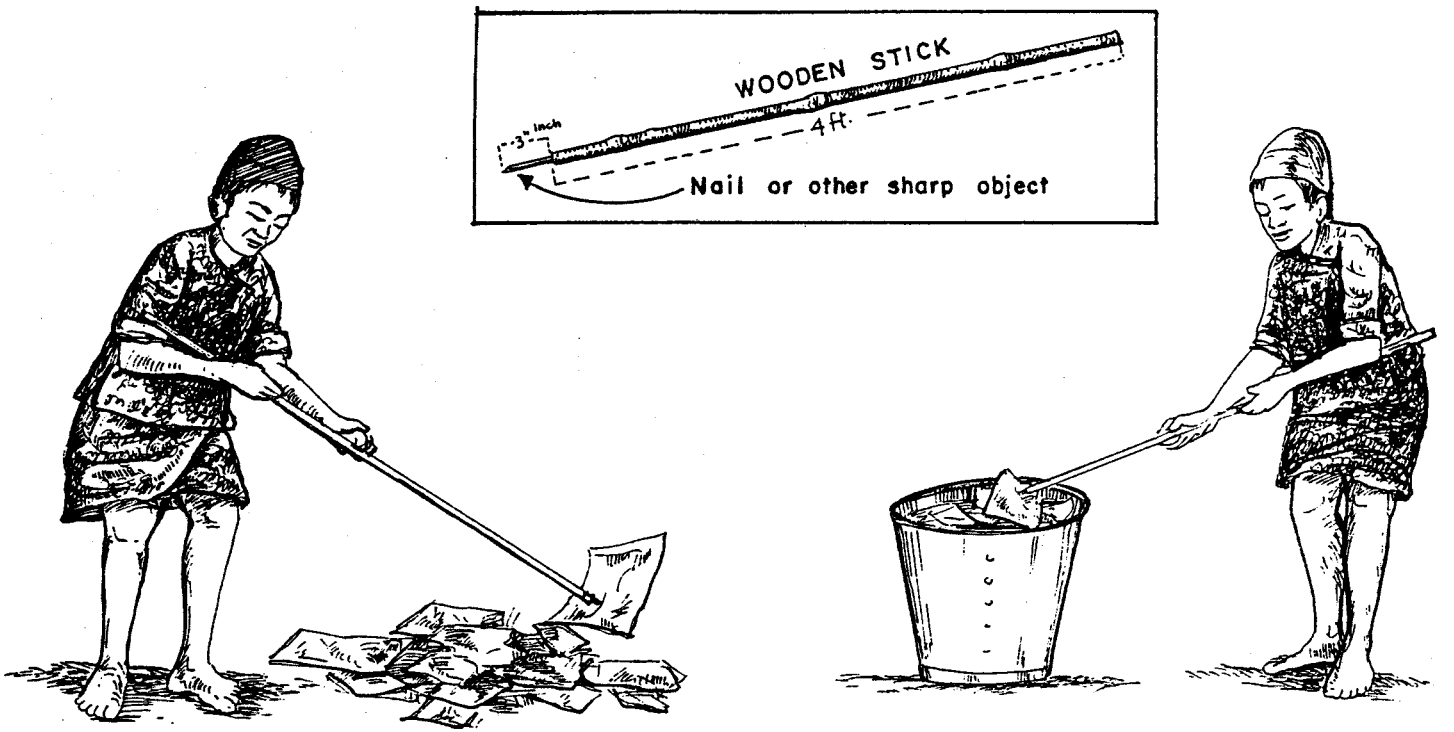
(2) Use a scoop and cardboard to pick up animal or human faeces. Remove the faeces on the cardboard and take it to a pit for burial or burning.

(3) Sweep the hospital grounds daily, and more often, if necessary. Use a broom and dustpan (Figure 7.3).

(4) Empty the dustbin twice each day or more often if full into a bucket or wheel barrow. Carry the waste to a site for burial, burning or city collection. Burn or cover the waste immediately. If the waste is collected by the municipality, store it in containers to prevent contact between the waste and the community (Figure 7.4).

Figure 7.2

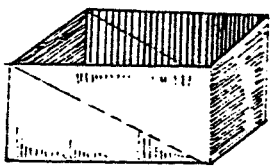
PAPER REFUSE COLLECTION DEVICE



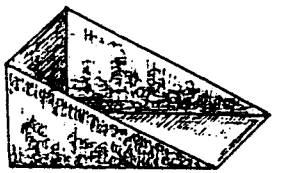
Attach a 3—4 inch nail to the end of a 4 foot wooden stick. Pick up paper refuse with the sharp point and place it into a container without touching the refuse with your hand.

Figure 7.3

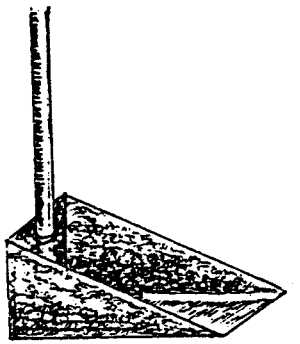
MAKING A DUSTPAN

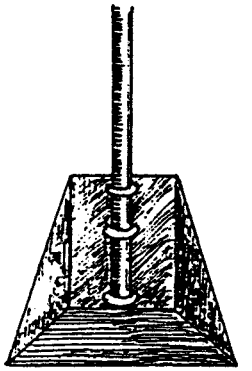


1. Card board box or metal tin.

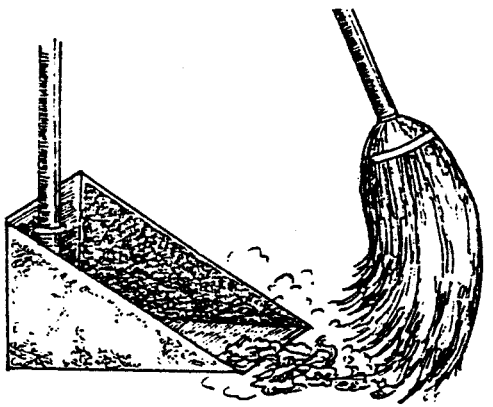


Cut on dotted line.





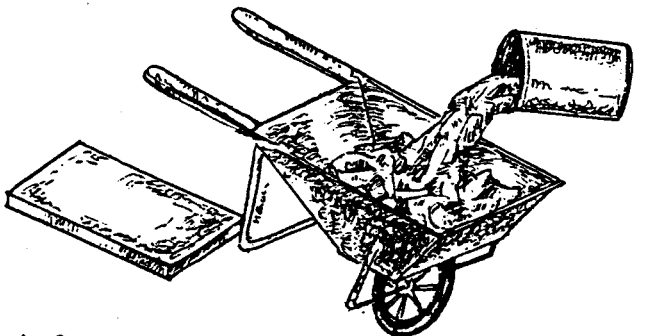
2. Attach stick firmly with string, wire, or tape.



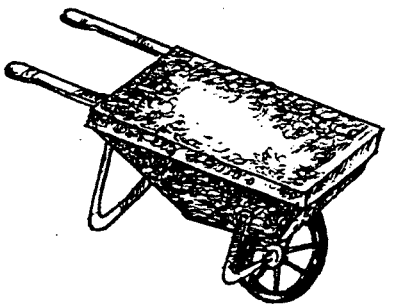
3. Sweep dust & refuse into dust pan &. carry to waste container.

Figure 7.4

WHEEL BARROW WITH LID FOR TRANSPORTING REFUSE

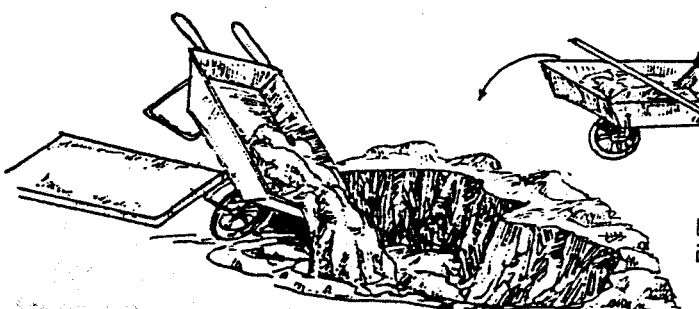


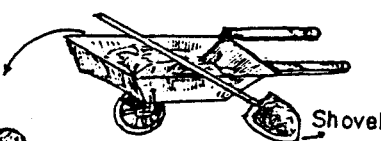
1. Collection of refuse (lid open)



2. Transport of refuse (lid closed)

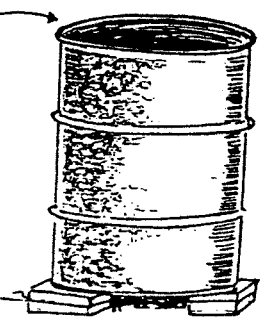
3. Disposal garbage pit or incinerator





Disposal of ashes from incinerator.

Oil barrel incinerator.



WALLS, CEILINGS, WINDOWS, WINDOW SCREENS, WINDOW FRAMES, CURTAINS, BEDSIDE SCREENS, LIGHT FIXTURES AND OTHER HOSPITAL EQUIPMENT

EQUIPMENT

- Soap and water
- Broom and mop
- Cloth
- Bucket
- Brush

PROCEDURE

(1) In your hospital/health post, establish a routine schedule to clean the walls, ceilings, windows, window screens, window frames, curtains, bedside screens, light fixtures and other hospital equipment (Figure 7.1).

(2) In addition to the routine schedule, clean these areas **whenever** they become soiled.

(3) Remove dirt from all the surfaces with a cloth or brush, soap and water and rinse thoroughly.

(4) Sweep the walls and ceilings weekly to remove dirt and cobwebs.

(5) Brush the window screens weekly to remove dust and dirt.

(6) Launder the curtains monthly or when visibly soiled.

(7) Wipe the furniture, bedside stands daily with a damp cloth.

(8) **Most important:** Scrub the patient's bed with soap and water. **Never** admit a patient into a dirty bed! When possible, in between patients, take the mattress and the pillow from the bed and place them in the sun for at least one hour.

Chapter 8

WATER SUPPLY IN HEALTH FACILITIES

EACH HEALTH FACILITY MUST HAVE A SAFE AND ADEQUATE WATER SUPPLY

A safe water supply is, as a minimum, at least protected against biological pollution, free of toxic substances and is acceptable to the nurses aesthetically. It is important to prevent the water source from contamination by pathogenic organisms. If the water source is contaminated, it is necessary to disinfect the water supply. However, preventing contamination is easier than treatment. An adequate water supply to a hospital or health post means water of a safe quality and of sufficient quantity for drinking, bathing and washing patients and other cleaning activities to promote and maintain a safe environment and limit the possibilities of disease transmission. It is especially important to have an adequate water supply for cleaning and flushing toilets and for maintaining a safe sewage system (Chapter 10).

Hands and equipment in contact with patients who have various illnesses and infectious diseases need to be washed thoroughly before and after exposure.

Estimated water requirements for hospitals and health posts are approximately:

Hospitals	300-500 litres per bed per day
Health Posts	1600-2500 litres per day

STEPS FOR SAFE AND ADEQUATE WATER SUPPLY

In health facilities, check the quality and safety of the water supply.

(1) Is the water stored in a clean manner, free from contamination?

(2) Is there an adequate amount of water supply to meet the needs of the institution?

If not, initiate appropriate action:

(1) In large urban areas, request the hospital board to make necessary plans and to take action. Plan the budget to include costs for improvement and maintenance needed to provide an adequate and constant supply of safe water.

(2) In small centres and rural areas, discuss with the panchayat leaders and together make plans for improvements and maintenance.

If the water is contaminated, disinfect the water at hospitals and health posts using the following methods:

METHODS TO DISINFECT SMALL QUANTITIES OF WATER WITH BLEACHING POWDER (CHLORINATED LIME)

EQUIPMENT

Chlorinated lime (bleaching powder)
Plastic bucket for mixing bleaching powder and water
Plastic containers, with cover for storage of stock solution
Earthen pot or large plastic closed bucket with a tap
Tablespoon for measuring
Large stick for mixing

PROCEDURE

(1) Store chlorine powder in a dark, cool, dry place, and in closed corrosion-resistant containers made of wood, ceramic or plastic. The container must be air tight because bleaching powder which contains about 25 per cent available chlorine becomes unstable when exposed to air, light or moisture causing the chlorine content to fall rapidly.

(2) Prepare a stock solution of 1 per cent by adding 40 grams (about 3 heaped tablespoons) to 1 litre of water. Mix and let it stand for about 20-30 minutes. This allows the solids to settle down at the bottom of the bucket.

(3) Pour the clear chlorine stock solution into another container for storage and use.

(4) Always keep the stock solution in a cool, dark place.

(5) To chlorinate the water which is clear and of light colour, add 3 drops of 1 per cent solution to each litre of water.

(6) Use clean vessels with a tap for storage of disinfected water. Wash vessels once a week or more often, if needed. Wash and rinse with heavy chlorinated or scalding water.

(7) If the water is clear, but highly coloured like weak tea, or if it has a noticeable sulphur odour, double the dosage.

(8) After adding the chlorine solution to the water, immediately and thoroughly mix the water and allow it to stand for about 20 to 30 minutes before using.

(9) Sufficient mixing can be obtained by pouring water from the container in which it is chlorinated into a storage vessel.

METHOD TO DISINFECT SMALL QUANTITIES OF WATER WITH IODINE

PURPOSE

To provide a safe water supply.

EQUIPMENT

Tincture of iodine
Container with cover

PROCEDURE

(1) Add 2 drops of iodine to 1 litre of clear, colourless water.

(2) If water is suspected to be heavily polluted, use 8 drops of iodine per litre.

(3) Do not use the water for 20-30 minutes after adding iodine.

(4) If water is cloudy, muddy or having noticeable colour, do not use iodine for disinfection.

METHODS TO DISINFECT WELLS OR STORAGE TANKS WITH POT CHLORINATORS

PURPOSE

To provide a safe water supply.

EQUIPMENT

Clay or plastic pot, 7-10 litres capacity with seven 6-8 mm diameter holes at the bottom.
Pebbles and pea size gravel
Bleaching powder
Sand

PROCEDURE

(1) Half fill the bottom of the pot with pebbles and pea size gravel.

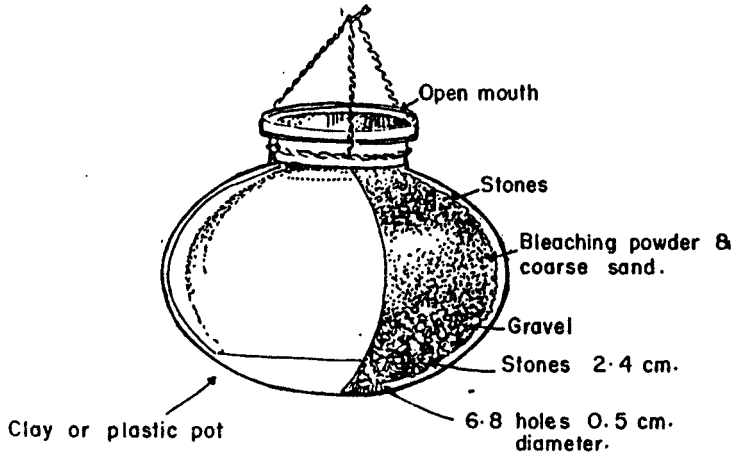
(2) Mix 1.5 kg. of bleaching powder with 3 kgs. of clean coarse sand (1:2 mixture).

(3) Place the bleaching powder and sand mixture on top of the pea size gravel.

(4) Fill the pot with pebbles up to the neck.

Figure 8.1

SINGLE POT CHLORINATOR



(5) Lower the pot with the mouth open into the well or storage tank to about 1/2 to 1 metre below water level.

(6) Allow the pot to stand for 2-3 hours before using the water.

(7) For a community well of 9-13 cu. metres content and daily use of 900 to 1300 litres (adequate for 40-60 people), a single pot chlorinator is sufficient to give adequate chlorination (0.2-1.0 mg per litre residue) for 10-15 days.

(8) For household wells of half the capacity 5-6 cubic metres and 450 to 650 litres, mix 1 kg. of bleaching powder with 2 kgs. of clean coarse sand (1:2 mixture).

(9) Place the mixture in jute sack. Tie and drop it into the well. This gives adequate chlorination for 2-3 weeks.

METHOD OF DISINFECTING AND MAKING SAFE OF CONTAMINATED/ DIRTY STORAGE TANKS OR VESSELS

PURPOSE

To provide a safe water supply.

EQUIPMENT

Bleaching powder
Hard brush
Plastic bucket

PROCEDURE

(1) Clean the wall and bottom of the tank or vessel thoroughly with a stiff brush. Remove all dirt and loose materials.

(2) Flush thoroughly with clean water before proceeding with actual disinfection.

(3) Use 250 grams of bleaching powder for every 1000 litres of water.

(4) Make a thin paste by mixing the bleaching powder with a small amount of water in a plastic bucket.

(5) Add paste to the water in the tank.

(6) Fill the tank with water so that the chlorinated water touches the entire surface.

(7) Allow it to remain for at least 6 hours (preferably 12 hours) before replacing with potable water.

METHOD OF DISINFECTING CONTAMINATED WELLS WITH BLEACHING POWDER (CHLORINATED LIME)

PURPOSE

To provide a safe water supply.

EQUIPMENT

Bleaching powder
Plastic bucket
Funnel
Plastic hosepipe

PROCEDURE

(1) Thoroughly pump out all the standing water in the well. In the case of flooding, continue pumping until all turbidity is removed and clear water is discharged.

(2) Prepare a chlorine solution in a plastic bucket by mixing 400 grams (30 tablespoons) of bleaching powder in 10 litres of clear water. Allow the chlorine solution to stand for about 30 minutes. This settles the solids in the bottom of the bucket. Gently pour off the clear chlorine solution into another bucket without stirring up the sediments.

(3) Carefully introduce the chlorine solution into the well by means of a funnel and a hosepipe extending to the deepest part of the well.

(4) After introducing the chlorine solution into the water, mix the water thoroughly by rapidly moving the hosepipe up and down a few times at each level as it is being slowly withdrawn from the well.

(5) Allow the chlorinated water to remain in the well for 24 hours. After this period of disinfection, pump out the well thoroughly to rid the well of chlorinated water.

(6) After the well is filled, assure safety of small quantities of water taken from the well using the procedures previously stated (Page 67-68).

METHOD TO COLLECT RAINWATER WITH ROOF CATCHMENT

PURPOSE

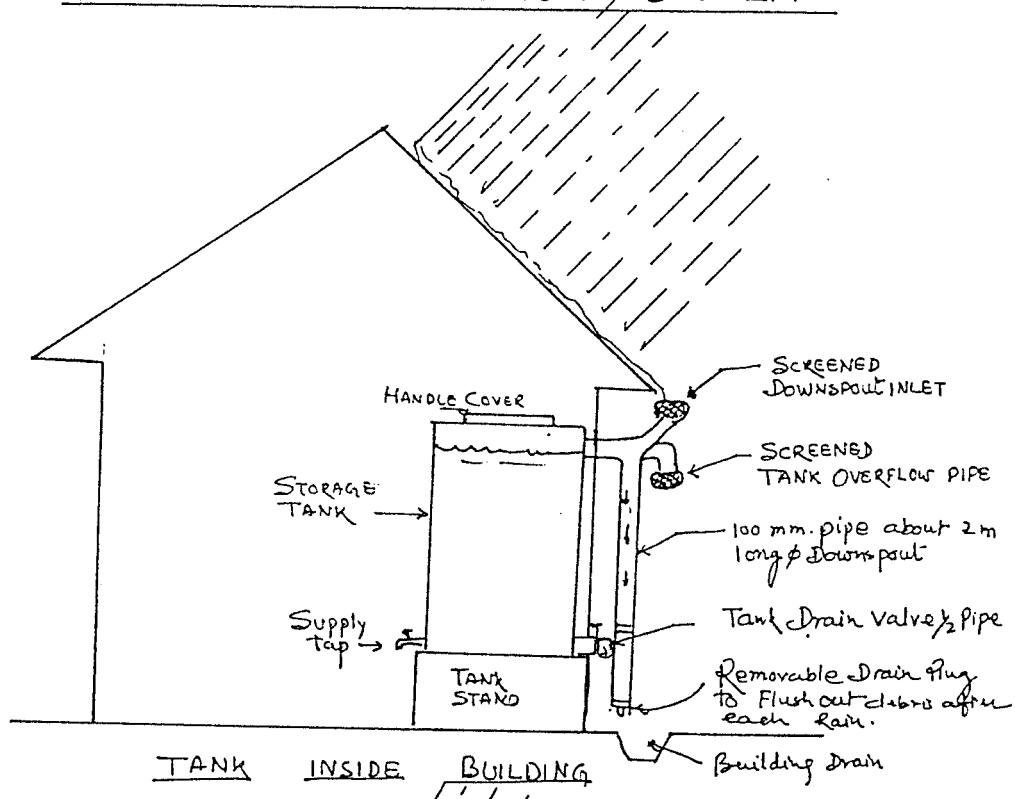
To ensure that rainwater collected for use as water supply is not harmful to the health of the people.

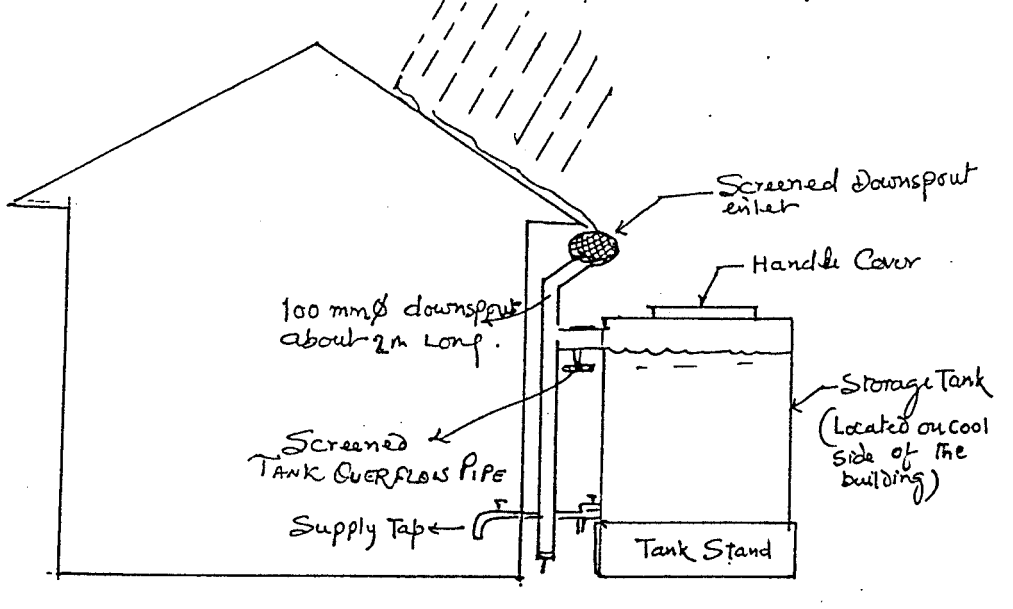
EQUIPMENT

Safe collection container
Rain spout
Wire mesh screen on rain spout.

Figure 8.2

RAINWATER COLLECTION SYSTEM





PROCEDURE

(1) Collect rainwater only from house roofs of tiles, slates, galvanized iron, asbestos or aluminium sheeting.

(2) Do not use rainwater from a thatched roof because of health hazards.

(3) Slope the roof gutters evenly towards the downspout to prevent pools forming where mosquitoes may breed.

(4) Clean the roof, before using for collection of rainwater as dust, dead leaves and bird droppings may accumulate on the roof during dry periods. It is important that these contaminated materials are not introduced into the storage tank.

(5) Arrange the downspout so that the first water from each shower is diverted away from the storage tank and allowed to run waste.

(6) Safeguard the quality of collected rainwater by cleaning routinely the roof and gutters. Keep tree branches away from the roof area to prevent leaves from collecting on the roof.

(7) Instal a wire mesh screen over the top of the downspout to prevent the collection of organic materials, or growth of bacteria and other micro-organisms.

(8) Disinfect water before it is used for drinking or food preparation. A simple disinfection device such as the pot chlorinator is useful in rainwater containers.

Chapter 9

HANDLING AND DISPOSAL OF NON-CONTAMINATED LIQUID AND SOLID WASTES

PURPOSE

The purpose of disposing of solid and liquid wastes of hospitals and health posts is to prevent cross-infection to the community and handlers. If proper procedures are not followed, collection of organic piles, both solid and liquid, create breeding places for flies, insects, and rats. In addition to being a potential carrier of diseases, uncollected wastes generate foul odours, are unsightly and may pose fire hazards.

PROPER COLLECTION, HANDLING, AND STORAGE OF NON-CONTAMINATED WASTES

DEFINITION

Solid wastes of hospitals and health posts consist of kitchen garbage, rubbish, such as waste paper, bottles, syringes, and other solid material. Liquid waste consists of wastewater from wash basins and kitchen sink.

EQUIPMENT

Use Equipment Only For Waste Disposal Purposes

Containers to store waste
Bucket to collect waste
Dustpan, shovel, broom (use a long-handled broom in order not to breathe in the dust while you are sweeping, see Figure 9.1).

PROCEDURE

(1) Store organic wastes (materials which become spoiled) in corrosion-proof washable containers, either plastic or galvanized iron. The containers should have tight-fitting covers and be easy to carry.

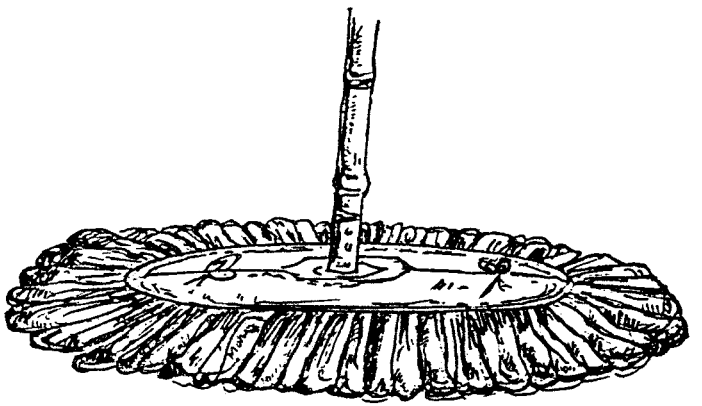
(2) Use wire or bamboo baskets for paper waste.

(3) Separate bottles and other non-combustible material from other wastes. Bury these in a separate location that is not in contact with the community.

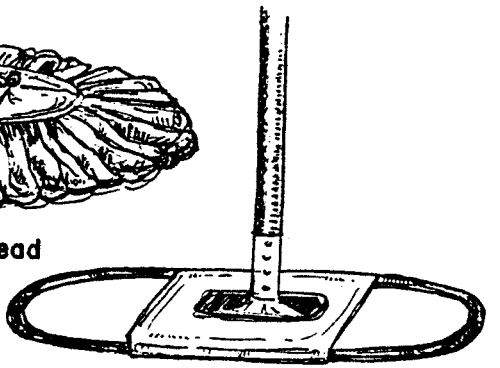
(4) Store needles and disposable syringes (damaged) in a glass bottle. When the bottle is full, cap and add it to the broken glass collection for burial.

Figure 9.1

LONG—HANDLED MOP



Mop with removable cloth mophead



Metal mop frame.

Long handled mop - patients and staff are protected from flying dust particles.

(5) Place the waste containers at convenient places for the users, having easy access for the handlers, and away from animals.

(6) Clean all containers used for organic waste with soap and water daily.

(7) Arrange for collection of organic waste containers daily, or more often, if needed, to prevent foul odours and insect breeding.

(8) Prevent scattering of wastes by using a covered wheel barrow to carry wastes from the health facility to the place of disposal.

(9) Clean all spillage immediately with a broom and shovel.

(10) If available, use heavy work gloves when handling wastes.

(11) Always wash hands after handling wastes (Figure 9.2).

PROCEDURE FOR SOLID WASTE DISPOSAL

1. Burial

- Bury in a specific location, away from the water source to prevent contamination of the watertable. A distance of 50 metres away is recommended to prevent contamination.

- Dispose the refuse in pits 3-4 feet wide, 6 feet deep and covered with 1/2-1 foot of earth each day.

- Cover the refuse with 2 feet of compacted earth to keep animals from digging up the buried refuse.

- Keep animals away by fencing the site (Figure 9.3).

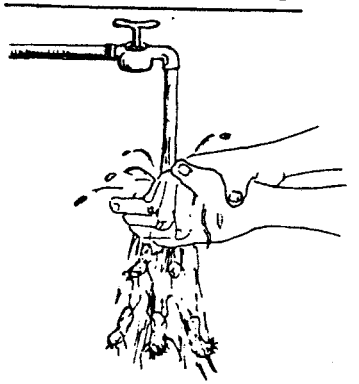
- Construct disposal site wall or fence with local materials, such as stone or bamboo with cactus or any other thorny plants (Figure 9.4).

- Locate the burial site away from dwellings which will not be subject to high watertable flooding. The minimum distance from the bottom of the pit to the watertable should be six feet.

- Site should have proper drainage, be located downhill from the well, away from the water course (minimum distance 30 feet) and be free of standing water.

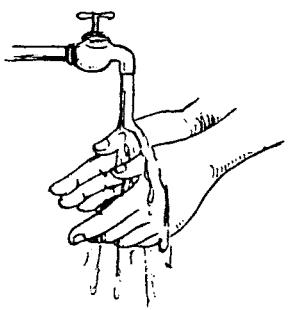
Figure 9.2

HAND WASHING

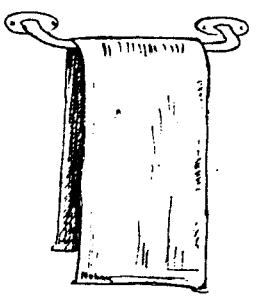


"Our Hero"

1. Vigorously wash hands with soap & running water; pay special attention to finger nails and spaces between fingers.



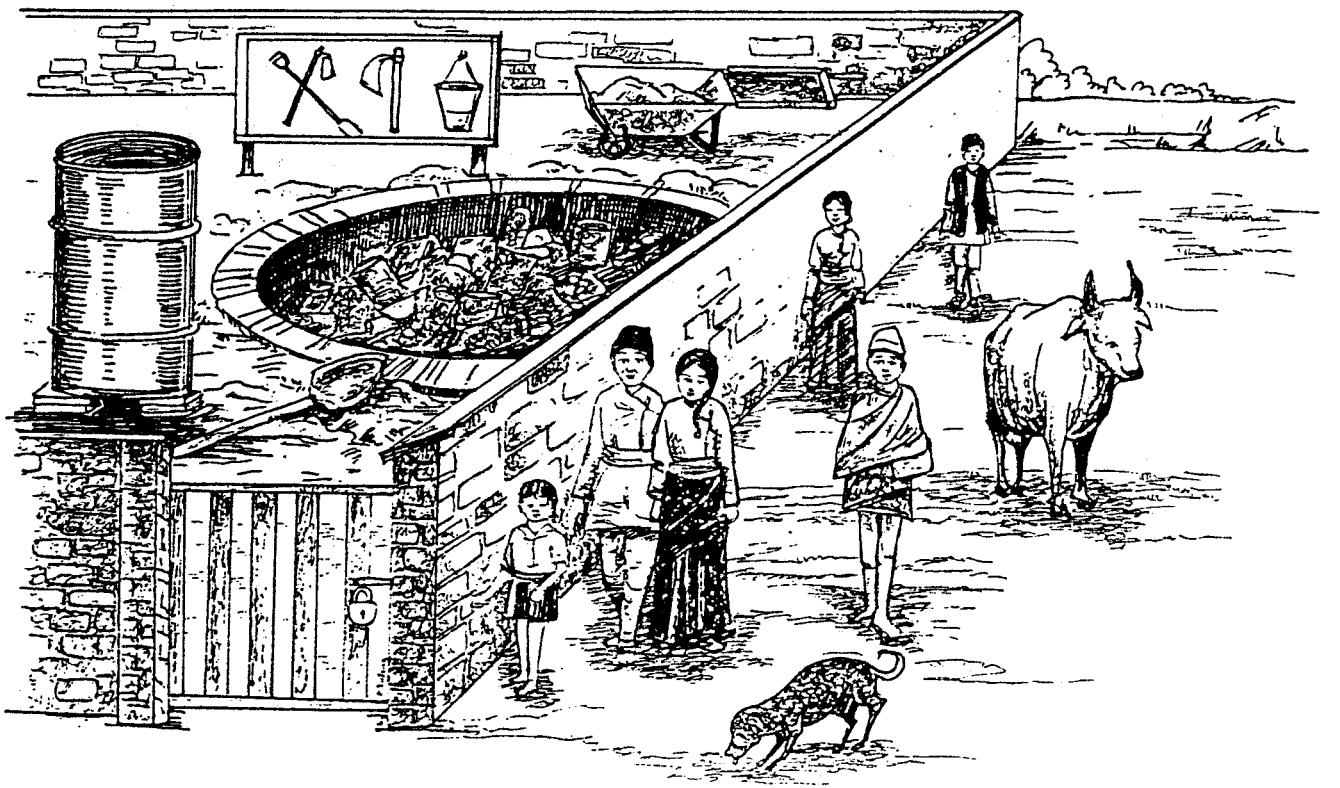
2. Rinse throughly under running water.



3. Dry carefully with clean dry towel.

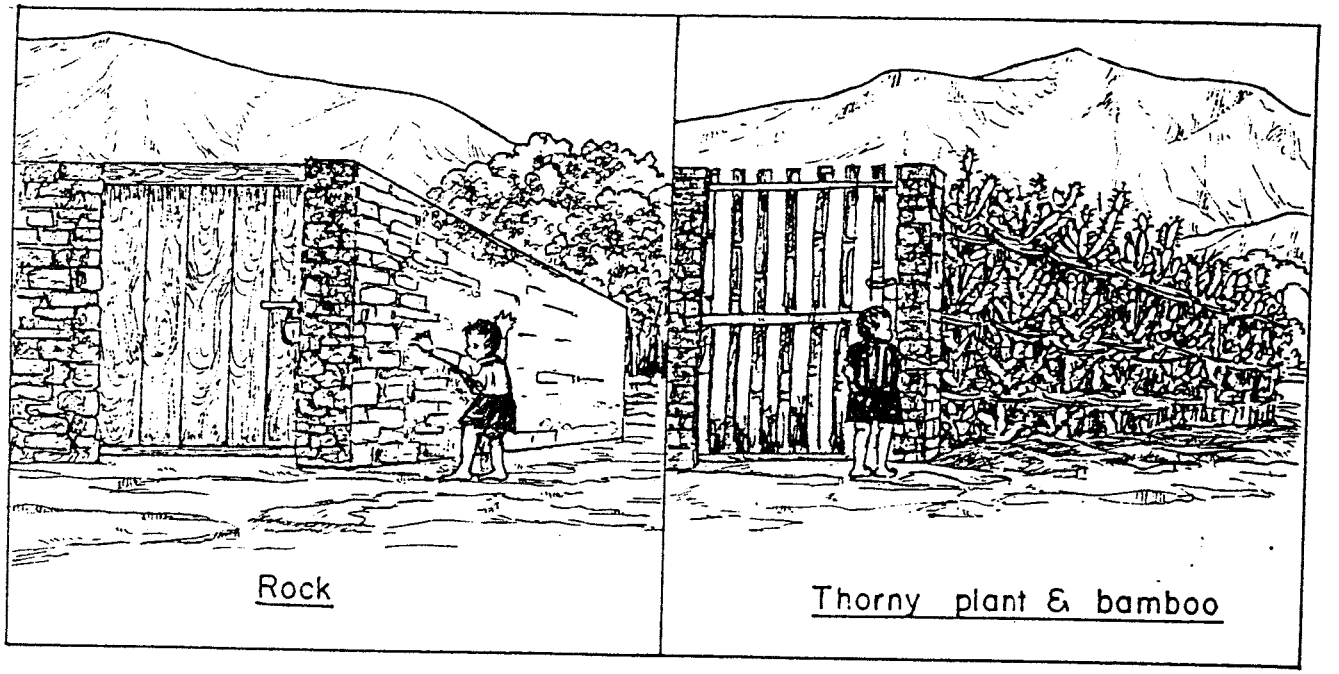
Figure 9.3

DISPOSAL SITE



Fence the disposal site to keep animals & people from picking up trash & catching or spreading disease.

DISPOSAL SITE WALLS



Disposal site wall may be built with local materials, such as stone or bamboo woven with cactus or other thorny plant.

2. Incineration

Use a simple incinerator to burn wastes (Figures 9.5, 9.6 and 9.7). Incinerate hospitals' and health posts' refuse which contains pathogenic materials. If the refuse is very wet, add a little kerosene or fuel oil so that a hot fire burns all of the waste. The incinerator must:

- be located away and downwind from the buildings;
- be built on hardened earth or a concrete base;
- have sufficient air inlets underneath for good combustion;
- have loosely placed fire bars to allow for their expansion;
- have an adequate opening for introducing fresh refuse and for cleaning out the interior, and
- have sufficiently long chimney for a closed incinerator to ensure good draught and evacuation of smoke.

3. Composting

Compost non-pathogenic, decomposable wastes with leaves and animal manure in a pit and cover with 1/2-1 ft. of soil. After a few months the compost can be dug up and used as fertilizer and soil conditioner.

4. Open Burning

Open burning is <u>not</u> a recommended method of waste disposal, because it results in scattering of materials and is unsightly and dangerous.

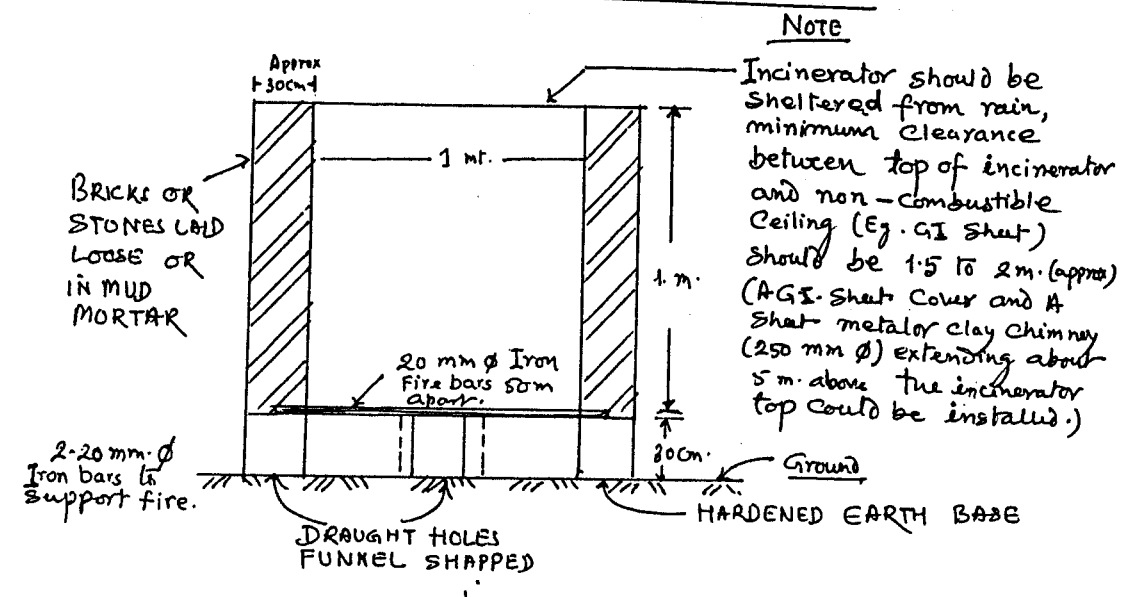
PROCEDURE FOR WATER DISPOSAL FROM WASH BASINS, LABORATORIES, AND KITCHEN SINKS

1. Soakage Pit

A soakage pit allows wastewater to drain into the soil. A soakage pit cannot be used in areas of heavy clay or rock, or near groundwater resources.

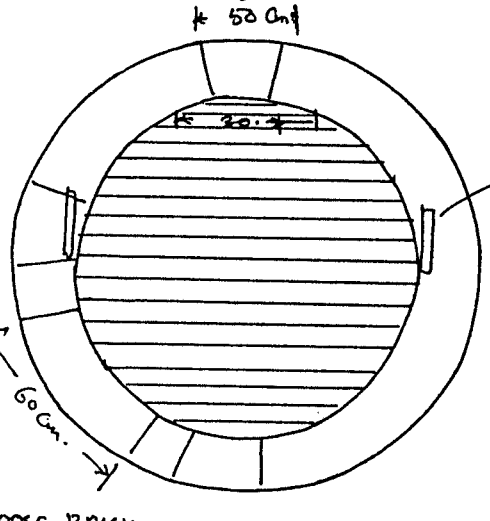
Figure 9.5

SIMPLE STONE OR MUD INCINERATOR



Note

Incinerator should be sheltered from rain, minimum clearance between top of incinerator and non-combustible ceiling (Eg. GI Sheet) should be 1.5 to 2m. (approx) (A GI. Sheet Cover and A Sheet metal or clay chimney (250 mm ø) extending about 5 m. above the incinerator top could be installed.)



PLAN

Note

OPTIONAL OPENING OF LOOSE BRICK OR STONES FOR CLEANING G.I. SHEET COULD ALSO BE USED AS A DOOR.

Figure 9.6

SIMPLE OIL DRUM INCINERATOR

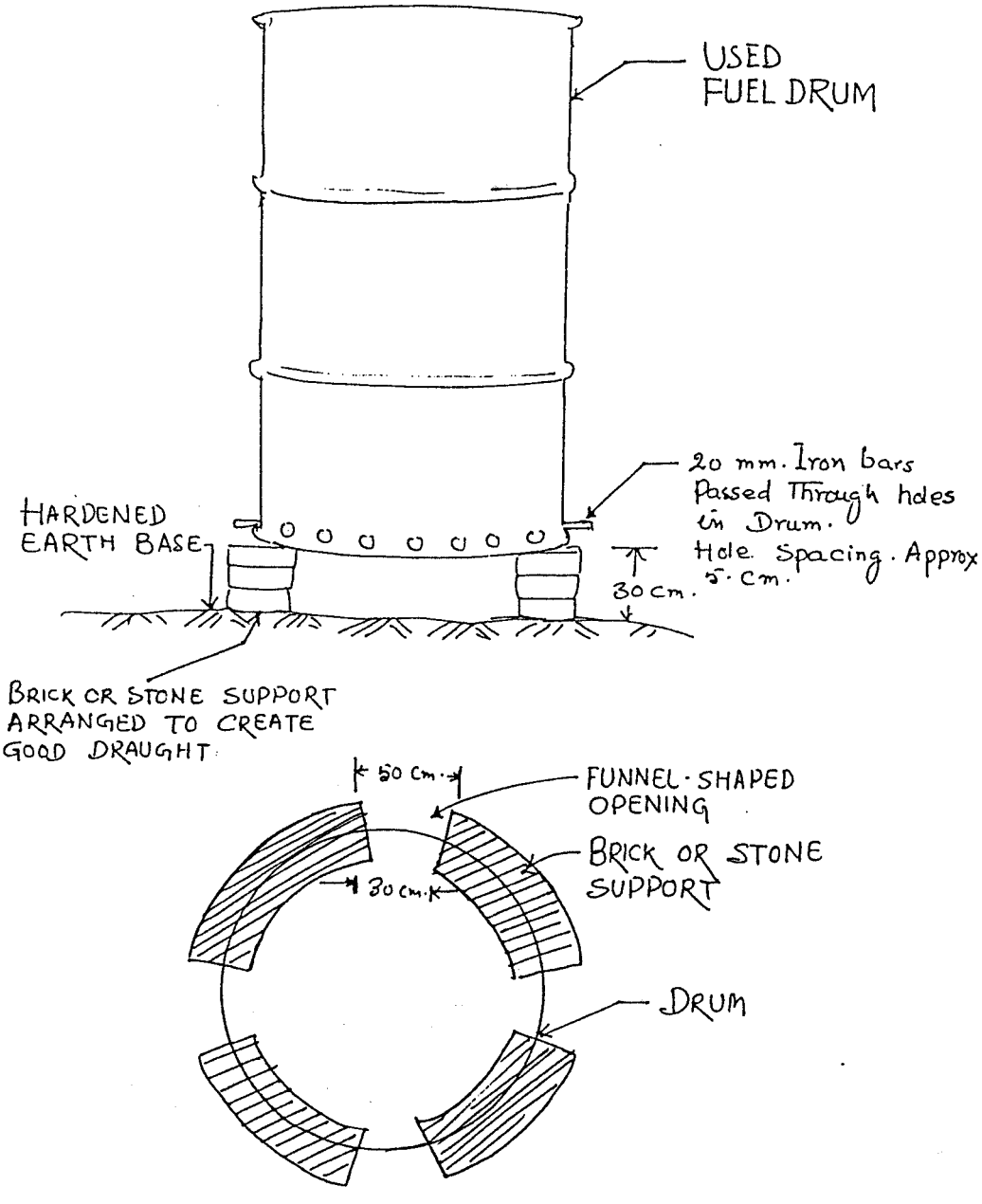
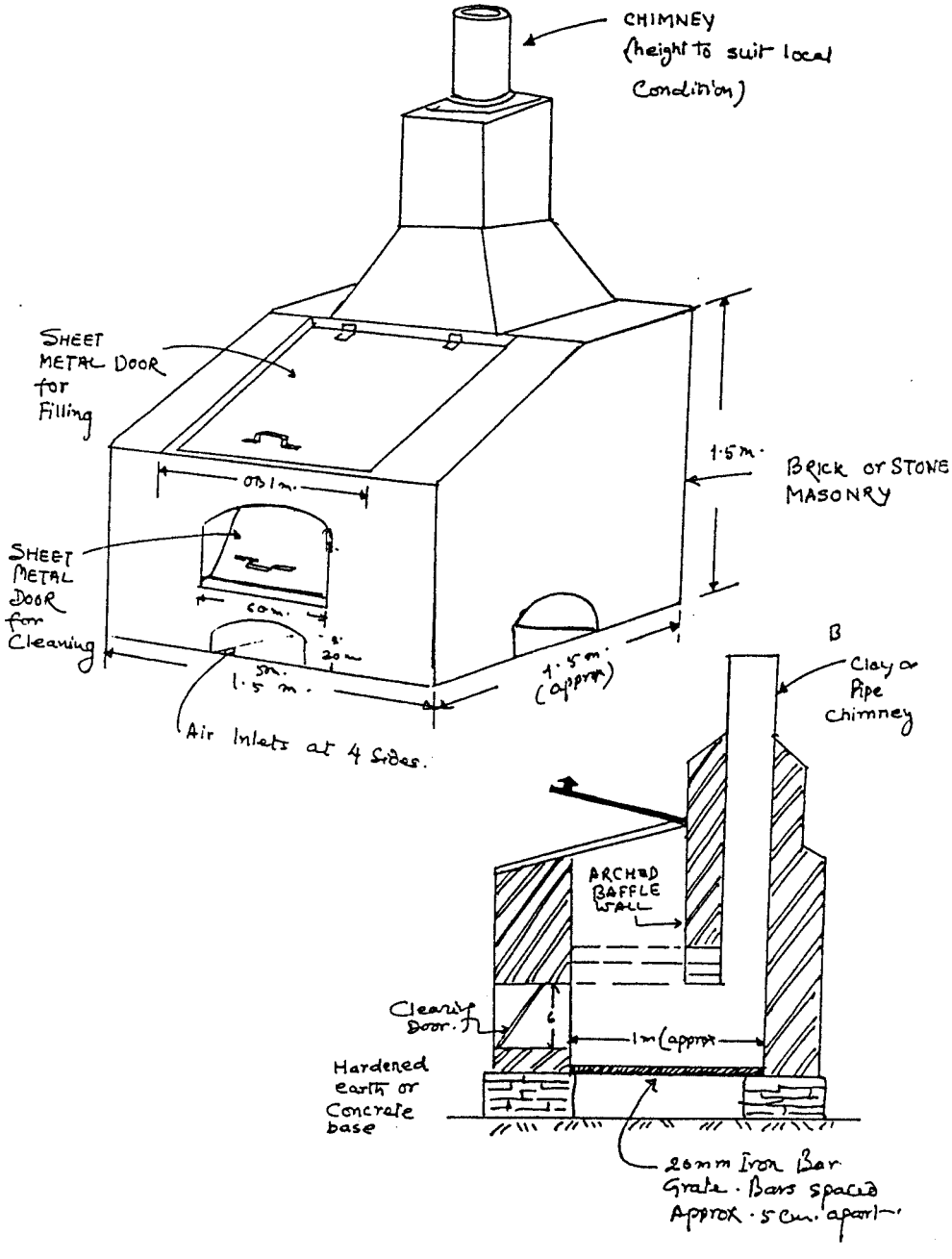


Figure 9.7

LARGE CAPACITY INCINERATOR



POINTS TO REMEMBER

(1) The size recommended for a soakage pit depends on the amount of wastewater and the condition of the receiving soil to percolate the liquid. In a wide range of soils, a soakage pit 3-4 feet deep, 3 feet diameter could drain out 50-70 litres per day.

(2) Connect kitchen sink drains to a grease tap before discharging into a soakage pit in order to avoid the soil clogging with grease and oil.

Figure 9.8

LOCATION OF SOAKAGE PITS AND SEPTIC TANKS

Recommended Distance from	Soakage Pits	Septic Tanks
	m ft	m ft
Buildings	3 (10)	1.5 (5)
Property boundary	1.5 (5)	1.5 (5)
Wells	30 (100)	30 (100)
Streams	30 (100)	7.5 (25)
Waterlines	3 (10)	3 (10)
Roads and Paths	1.5 (5)	1.5 (5)
Trees	3 (10)	3 (10)

2. Evapotranspiration Mound

(a) Use where soil conditions do not allow the liquid for soakage pits to soak into the ground (e.g., in heavy clay and rock) or where groundwater could be contaminated.

(b) Fast growing grasses on the mound will take up the water which is lost into the atmosphere by transpiration and evaporation.

(c) Locate the mound on a site which is not subject to flooding.

(d) Construct the ground well and manage it properly.

Chapter 10

SAFE HANDLING AND DISPOSAL OF CONTAMINATED LIQUID AND SOLID WASTES

PURPOSE

To prevent the spread of infection and to prevent accidental injury to staff/patients within the hospital or health post setting from potentially hazardous waste.

Hospital waste is often highly contaminated with pathogenic micro-organisms. In addition, they may contain items capable of inflicting injury if not handled properly (i.e., needles and broken glass). Wastes from the microbiology laboratory, laboratories handling blood specimens and blood products, urine/stool, pathology service, operation theatres, emergency rooms, and from patients with communicable diseases or infected wounds must be given special attention. Items or persons having contact with these wastes may potentially spread disease. To reduce the risk of spreading infection to patients and community, there must be a safe, realistic and practical plan for the disposal of the potentially contaminated waste.

METHODS FOR HANDLING AND DISPOSAL OF LIQUID WASTES COLLECTED FROM PATIENTS, SUCH AS URINE, STOOL, BLOOD AND BLOOD PRODUCTS, OR BODY FLUIDS (SPUTUM, PUS, PERITONEAL AND SPINAL FLUIDS)

PROCEDURE

(1) Carry waste in a covered collection container to a latrine or a utility sink (not handwashing sink).

(2) Carefully pour the fluid into the latrine or utility sink being careful to avoid any splashing of the material.

(3) Rinse the latrine or sink carefully and thoroughly with water.

(4) Clean the collection container by following the cleaning/disinfection procedure (Chapter 5).

PROCEDURE FOR HUMAN WASTE DISPOSAL SYSTEM

Figure 10.1 describes the various alternative systems for human waste disposal indicating selection, criteria, advantages, disadvantages, and estimated costs of each system (based on 1983

Kathmandu prices). For detailed drawings and construction information, contact a government resource, WHO, UNICEF, or other agencies.

Points to be Noted When Installing Latrines

(1) Locate latrines on dry level ground, well drained from flooding.

(2) Place the latrine downhill from all wells in order to avoid the possibility of contaminating the well water.

(3) Where an uphill location is inevitable, place the latrine **at least 15 metres** (50 feet) away from the well so that natural filtration by the soil will prevent bacterial pollution at the well.

(4) Make a careful site investigation in areas with fissured rock, boulders or gravel as seepage from the latrine may travel long distances without natural filtration in this type of ground.

(5) Clear the areas immediately around the latrine of vegetation, waste and debris.

(6) See that the latrine has a sufficient number of seats for the convenience of the users. Provide at least five to six seats for every 50 in-patients in health institutions.

(7) Always make water and soap readily available for handwashing and cleaning. A bucket chained to the wall to prevent use for other things can be used for flushing (Figure 10.2).

(8) Instal separate latrines for men and women, where possible.

(9) Instal simple visual aids on the wall inside the latrine showing "Do's" and "Don'ts" on how to use the latrine, in order to teach the users (Figure 10.3).

(10) Assign specific attendants, trained in cleaning the latrine, to clean the latrines properly and on a regular basis. The latrine should be cleaned at least once in the morning and once in the evening.

(11) Provide separate cleaning equipment specifically for latrine maintenance, such as bucket, soap, brush, and disinfectants. Make available a utility closet to store the equipment.

DESCRIPTION OF LATRINE ALTERNATIVES

	Type of System	Description	Selection Criteria	Advantages	Disadvantages	Estimated Cost
DRY SYSTEM	1. Simple pit Latrine	Simplest system consisting of a hole in the ground which is replaced by a new pit when about 2/3 full Cover the old pit with earth	Little or no water available Insufficient funds for other types of toilets Little building material available Little building skills Household use	No water needed Very low-cost Local materials can be used Simple, easy to build using local skills Lasts 5-6 years, if sized properly Moderate hygiene benefits	Must be located away from house due to possible bad odours New latrine needed once pit is filled Flies and mosquitoes could breed Could contaminate groundwater where watertable is high	For 6-8 users (size 1x1m and 2 metres deep) Costs approximately Rs.300 for building the superstructure
WET SYSTEM	2. Ventilated Improved Pit (VIP) Latrine	Type "A" Same as simple pit latrine, but with a screened vent pipe painted black to remove smells and prevent flies breeding Type "B" With removable cover to take out accumulated excreta and solid masonry with superstructure	Type "A" Same as simple pit latrine Type "B" Building materials for squatting plate pit and superstructure	Type "A" Same as simple pit latrine, but with little odour and flies Type "B" Same as above, plus it is permanent as pit can be emptied Pit contents can be utilized for composting	Type "A" New latrine once pit is filled Could contaminate groundwater if water table is high Type "B" Health hazard from handling excreta emptied from pit	Type "A" Approx.Rs.300 for 6-8 users Type "B" Approximately Rs.1200 for 6-8 users unit

Approximately Nep. Rs. 25.10 = US$ 1.00

	Type of System	Description	Selection Criteria	Advantages	Disadvantages	Estimated Cost
WET SYSTEM	3. Pour-flush (PF) Latrine (Compost Type)	Consists of a squatting pan and trap of water seal set in a concrete floor or bricks sealed with a layer of cement. After use it is flushed by hand with 3 litres of water. Excreta is carried by pipe or drain into 2 honeycomb soakage pits which are used alternately. Once pit is filled, it is taken out of use and excreta is diverted to the second pit. Filled pit is left for about 2 years to allow solids to compose into humus which is safe to handle Cover the pit with a strong material.	Availability of: Water to flush toilet Space for alternating soakage/composting pits Building skills for masonry work Sufficient funds Arrangement for removal of pit contents	Can be built inside or outside house No odours No health hazards Convenient use Easy to clean Small quantity of water required Relatively simple construction Composted solids can be used as fertilizer Low cost (less expensive than septic tank systems)	Requires water Could contaminate groundwater, where watertable is high Requires certain amount of skill to construct Composted material may not be socially acceptable for use More expensive than pit latrines Not suitable for areas of hard rock or rock or clay where liquid cannot penetrate	Approximately Rs.1 300- 2 000 for 5-6 users

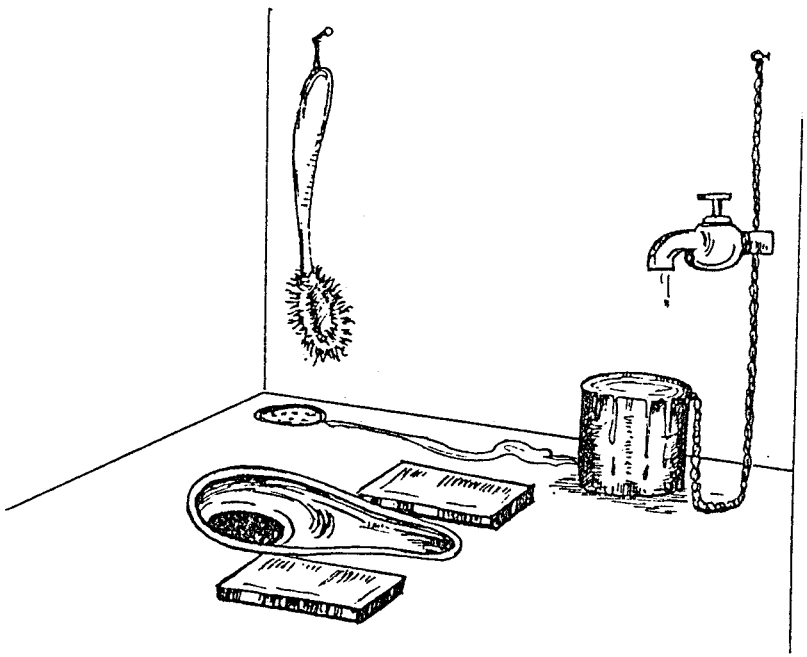
	Type of System	Description	Selection Criteria	Advantages	Disadvantages	Estimated Cost
WET SYSTEM	4. Aqua-Privy Latrine	A simplified septic tank system with excreta deposited directly into a tank through a simple vertical drop pipe or a pour flush water seal pan. Requires much less water than flush system (about 9 to 10 times less)	Availability of: Regular, adequate water supply inside the premises Sufficient space for soakage pit Favourable soil condition for soakage pit Sufficient funds Sludge removal semi-annually	Can be built inside the building Low water use Easy to clean No odours No health hazards* Convenient Intermediate between pit latrine and cistern flush toilet Low cost compared to septic tank (about 1/3 to 1/2)	Higher cost than pit, VIP or PF latrines Requires skilled construction Health hazard in depositing sludge Needs regular cleaning of drop pipe Drop pipe can be clogged by sticks Not suitable in hard rock or clay areas Requires constant water level	Approximately Rs.4 000 - 5 000 for 10 users

*Except when handling sludge from septic tank.

	Type of System	Description	Selection Criteria	Advantages	Disadvantages	Estimated Cost
WET SYSTEM	5. Cistern Flush Toilet with Septic Tank and Soakage Pit	A water seal toilet with a cistern water tank for flushing water closet. Outlet is connected to septic tank and soakage pit or to a sewerage system	Availability of: Adequate water supply inside the premises Sufficient space for septic tank with soakage pit Sufficient funds Soil condition favourable for soakage pit (i.e., good percolation in soil without hazard to groundwater) Skilled labour Sludge removal semi-annually	Can be built inside buildings Easy to clean No odours No health hazards* Very convenient "High technology" or "modern" appeal	High Cost Requires large amount of water to flush (8-10 litres per flush) Not suitable in hard rock or clay areas Could have mechanical problems with the flushing system Requires skilled labour to construct High maintenance cost Health hazard when deposing sludge	Cistern toilet (without superstructures) for 10 users Rs.1 800 Septic tank with soakage pit Rs.7 000 Total approximately Rs.8 800

*Except when handling sludge from septic tank.

HELP KEEP TOILETS CLEAN

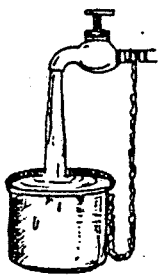


Supply each toilet with water. An aluminum can chained to the faucet or wall cannot rust, break, or be removed. A slanted floor will allow excess water to drain properly. Supply a brush to clean toilet pan. Follow a cleaning schedule.

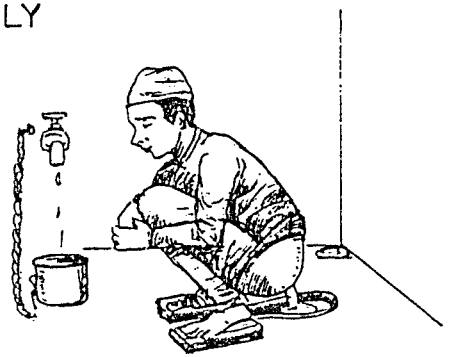
Figure 10.3

USE POSTERS

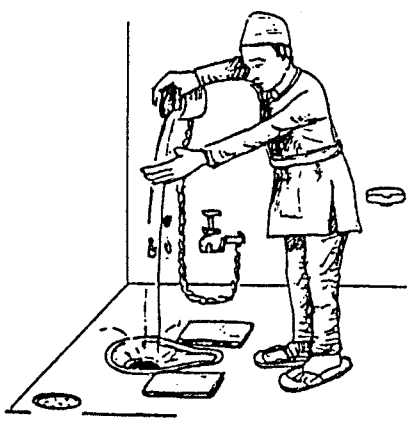
TEACH PATIENTS & VISITORS TO USE TOILETS PROPERLY



1. Fill can with water.



2. Use toilet. Make sure all excreta goes into toilet.



3. Wash hand. So that water goes in to toilet & not on the floor.

4. Rinse toilet wall. Leave it clean for the next person.

TEACH PATIENTS AND VISITORS THE FOLLOWING IMPORTANT POINTS TO REMEMBER WHEN USING THE LATRINE

- Fill the can with water
- When using the toilet, make sure all excreta goes into the hole.
- Wash hands so that water goes into toilet and not on the floor.
- Rinse toilet well and leave it clean for the next person.

Handling and Disposal of Solid Wastes, Such as Dressings, Body Parts, and Disposable (Wood or Paper) Collection Containers

(1) Collect or store wastes in small corrosion proof washable containers of plastic, or metal galvanized iron with fitting covers.

(2) Collect the waste containers on a daily basis and transport them to the incinerator.

(3) Burn the waste immediately before it can spread into the environment. Incineration is the best method to kill micro-organisms contaminating this type of waste.

Handling and Disposal of Sharp Objects, Such as Scalpel and Razor Blades

(1) Put used items into an empty intravenous bottle located in the nurses station (DO NOT PLACE THESE ITEMS INTO A GARBAGE PAIL).

(2) When the intravenous bottle is full, cap or plug it tightly.

(3) Dispose of the intravenous bottle with other non-combustible waste by burial.

Handling and Disposal of Microbiology Wastes, Such as Culture Plates and Specimen Containers

(1) Autoclave used culture plates and specimen containers.

(2) After autoclaving, remove the media and discard into the waste bucket.

(3) Wash and dry the containers thoroughly.

(4) Place specimen containers which are not reusable in a covered garbage container and remove them for burial.

Chapter 11

PROPER HANDLING AND STORAGE OF CLEAN AND CONTAMINATED LINEN

Soiled linen with large amounts of microbial contamination may spread infection to hospital patients and personnel. Soiled linen must be cleaned properly in order to minimize the risk of spreading disease to patients and employees. Washing the laundry with detergent and hot water is the method to make the linen safe.

GENERAL PRINCIPLES

(1) It is important to clean the laundry department daily or more often, if needed.

(2) Always separate the clean areas from the dirty areas.

(3) Protect the personnel who sort the laundry with garments that cover their own clothes e.g., gown and mask.

(4) Provide a repair and mending facility in the laundry department.

Procedures for Collecting, Washing, Distributing, and Sorting Linen

PURPOSE

To remove micro-organisms from the linen and protect patients and employees.

EQUIPMENT

- Soiled (with faeces, blood, body waste) linen collector
- Dirty (used) linen collector
- Washing facilities, e.g., sink and washing machine
- Drying facilities (dryer, ropes)
- Covered storage facilities (closed space used for linen only)
- Soap and detergent
- Adequate water supply
- Gown, gloves, masks and cap for the laundry staff
- Buckets or container to soak contaminated linen.

COLLECTION OF USED LINEN

(1) Collect all dry linen in a covered linen trolley (Figure 11.1).

(2) Handle soil linen as little as possible. Collect in a separate plastic bag or covered bucket.

(3) Collect separately the linen from isolated patients and label it with red ink.

WASHING LINEN

(1) Soiled or contaminated linen

- handle carefully in order not to touch the soil (wear rubber gloves, if available).
- remove all solid material, then soak for 30 minutes in warm water with washing powder or water with 1% phenol (1 cc of phenol concentrate in 1 litre of water).
- wash your hands thoroughly.
- after soaking, wash the linen following the procedure described below for dirty linen.

(2) Dirty linen

- wash vigorously with an adequate supply of hot water, soap, and bleach.
- rinse the linen thoroughly.
- dry in the sun by hanging linen from a clothesline. Never put linen on the ground to dry because it will be contaminated by the dirty ground.

STORAGE

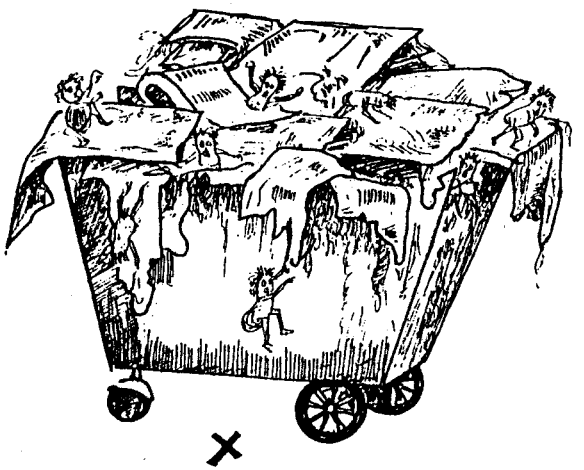
Take the clean linen from the laundry to the linen storage room in a clean trolley with cover. Store in a separate well-ventilated room or cupboard.

DISTRIBUTION OF CLEAN LINEN

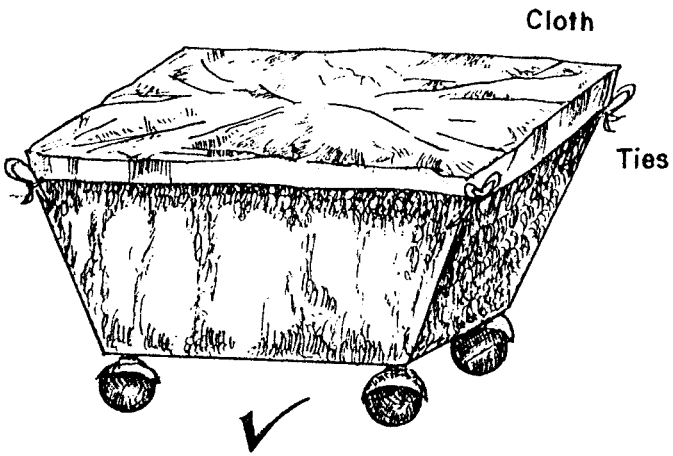
Distribute the clean linen to the wards in a separate trolley with cover.

Figure 11.1

TROLLEY FOR LAUNDRY



Linen trolley without cover - dirty laundry – germs spill over into air & onto floor.



Linen trolley with tightly fitting cover - germs and laundry stay in trolley.

Chapter 12

INTENSIVE CARE UNIT INFECTION CONTROL

To reduce the risk of infection to the patient in the intensive care unit, where there is frequent patient contact with health care personnel, and frequent use of patient invasive devices.

GENERAL RECOMMENDATIONS

Handwashing

(1) Always use strict handwashing between all patient contacts and when otherwise indicated.

(2) Provide sufficient handwashing facilities in convenient locations.

(3) Supply antimicrobial soap for handwashing when indicated.

Medical Devices

(1) Prepare adequately the patient's skin with antimicrobial agents (betadine, alcohol) before starting an invasive procedure (e.g., cut down insertion of intravenous devices, central venous pressure lines, tracheostomies, etc.).

(2) Develop protocols for care of lines and ensure strict adherence.

(3) When intravascular lines are inserted during a crisis without aseptic technique, change the lines when the patient is stabilized.

(4) Date all irrigating fluids when opened and discard every 24 hours. Opened bottles can easily become contaminated and serve as a reservoir for micro-organisms.

(5) Develop policies and procedure for the safe processing of equipment.

(6) Provide adequate education to the staff of the intensive care unit about the invasive devices. This information should include the risk of infection, possible consequence of infection and "hands-on" practical sessions on assembling, maintaining and cleaning the devices.

Environmental Control

(1) Allow sufficient space around each patient for tne necessary equipment and passage of health care personnel.

(2) Place patients in a manner which decreases the opportunity for cross-contamination.

(3) Use a private room for patients on strict or respiratory isolation.

(4) Consider all body fluids contaminated and perform all tests on measurements in a separate area away from the areas used for preparation of medicine and food.

(5) Establish clean and dirty areas in the unit to prevent cross-contamination (Figure 12.1).

(6) Wash all horizontal surfaces daily using a germicidal solution.

(7) Wipe out immediately all spills of blood and body fluids using a germicidal solution.

Visitors

(1) **Never allow ill visitors** to enter the intensive care unit.

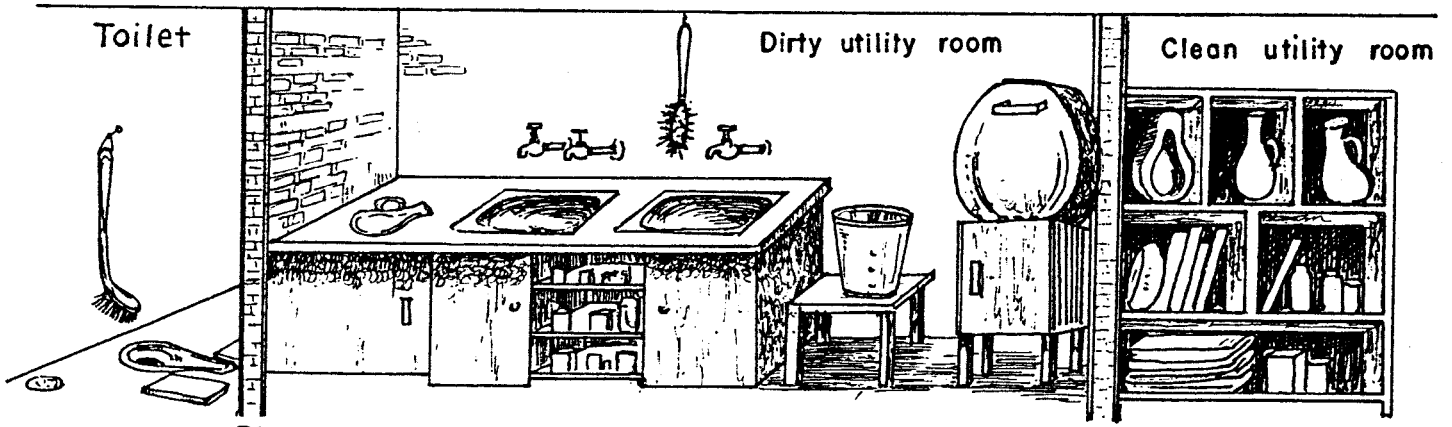
(2) Give visitors shoes and a gown to wear on entering the intensive care area. The shoes must not be taken off before the visitors leave the area. The gown must be placed in a container for dirty linen.

(3) Limit visitors to two at a time per patient.

(4) Evaluate each patient's conditions separately and limit the visiting time so that it does not interfere with proper rest and the treatment needed.

Figure 12.1

CLEAN & DIRTY UTILITY AREAS



Dirty & clean utility areas should be separated by a wall

Chapter 13

PREPARATION AND STORAGE OF MEDICINES IN THE PHARMACY

PURPOSE

To obtain, store, prepare and distribute medicinal preparations in a safe manner and to prevent bacterial contamination during pharmaceutical preparations.

GENERAL EQUIPMENT

Washing facilities with hot and cold running water.

Separate sinks for washing hands and equipment, located in convenient places.

Soap and detergents.

Gloves, gowns, masks for the working staff.

Assorted sizes of bottle brushes.

Racks for drying gloves and brushes.

PROCEDURE

Preparation of Oral Products, including Tablets, Capsules, Liquid Medications and External Feeding

(1) Wash your hands before mixing, packaging or dispensing drugs.

(2) Use a "no-touch" procedure for counting the tablets and capsules.

(3) Use clean equipment for mixing the powders.

(4) Use pre-packaged unit doses, when available, to facilitate clean dispensing.

PROCEDURE

Preparation of Medications for Injection or Topical Application, such as Ointments, Powders and Topical Solutions

Use the above procedure with the following additions:

(1) Use sterile diluents.
(2) Use a unit dose, when possible.
(3) Date the solution and discard it when it expires.

Preparation of Products for Injection into Skin and Tissue via Intramuscular, Subcutaneous or Intradermal Routes or into Body Cavities or Organs

(1) Wash your hands before preparing or drawing up the solution into the syringe.

(2) Use sterile needles, syringes, water and saline for the solution.

(3) Cleanse all the injection ports with an antimicrobial agent (alcohol) prior to entry.

(4) Refrigerate the solution (if appropriate) and define clearly the expiration time or date by which the mixed product must be used or discarded.

Preparation of Parenteral Solutions, such as Intravenous Fluid Replacement, Nutritional Fluids (TPN) which contain Proteins, High Glucose Concentrations and Small Volume Solutions to Provide Medications

(1) Check all containers of parenteral fluids for visible turbidity, leaks, cracks, and particulate matter. Also check the manufacturer's expiration dates before admixing and again before distribution. If a problem is noticed, **DO NOT** use the fluid (Figure 13.1).

(2) Avoid extreme temperature in the storage areas (i.e., near flame or outside shed).

(3) Always handle the containers carefully.

(4) Wash your hands with an antimicrobial prior to admixing parenterals.

(5) Wear gown, gloves and a mask when admixing large numbers of parenterals.

(6) Use a single dose vial, when possible, and discard after use.

(7) Date multi-dose vials when they are opened and discard after 72 hours.

(8) Check the multi-dose label or package insert to see if refrigeration is necessary and follow instructions carefully.

Figure 13.1

CHECKING I.V. FLUIDS BEFORE USE

Before use, check I. V. fluids. Look for cloudiness, leaks, cracks and floating particles. If a problem is found, DO NOT USE FLUID. Discard in refuse container immediately.

(9) Label each admixed parenteral with the additive, dosage, expiration date, date of preparation and identification of personnel admixing. This can identify products for recall or identify a possible source of infection.

(10) Refrigerate all admixed fluids to inhibit the growth of micro-organisms or use within six hours of admixture.

(11) Carefully clean the preparation area on a regular basis.

Chapter 14

CLEAN AND SAFE KITCHEN

The kitchen area plays an important role in the prevention of the spread of infection. Without proper sanitation and safety for food, equipment and cleaning supplies, outbreak of food-borne illness could occur.

PURPOSE

(1) To provide safe food to patients and employees by maintaining clean, sanitary work and storage areas and proper equipment for the handling of food supplies, and

(2) to minimize contamination of food and beverages by micro-organisms and chemicals that may result in food poisoning.

EQUIPMENT

Cleaning agents (Vim powder, soda)
Adequate hot and cold water supply
Sufficient working area
Smokeless stove
Pots, pans, utensils, trays

PROCEDURE

(1) Wash your hands thoroughly before preparing and serving food.

(2) Wash the pots, pans, utensils and trays thoroughly with hot water and detergent.

(3) Serve food as soon as possible after preparation.

(4) Minimize hand contact of food by supplying suitable utensils for preparation and serving.

(5) Do not allow employees with communicable diseases (e.g., upper respiratory illnesses, skin infections and enteric diseases) to handle food or equipment. Arrange health check-up programme for kitchen employees (Chapter 16).

(6) Provide adequate shelf space for all food. Allow a floor clearance of 4 to 6 inches to permit proper floor cleaning.

Figure 14.1

SMOKELESS STOVE

(7) Establish adequate arrangements and cleaning procedures for storage areas of food and supplies in order to prevent contamination by rodents, insects and moisture.

(8) Do not purchase or use cracked or spoiled eggs because of Salmonella contamination.

(9) Handle trays and utensils from patients with communicable diseases separately. Wear gloves and wash the trays and utensils with hot water and bleaching agents.

(10) Discard all portions of food not eaten by the patient.

(11) Use a smokeless stove to cook food in order to protect kitchen staff from respiratory complications. Contact UNICEF for information on purchasing a smokeless stove for your hospital kitchen (Figure 14.1).

Chapter 15

ISOLATION

INTRODUCTION

Spread of infection within the hospital or health post requires only three essential elements: a source of infecting organisms, a susceptible host, and a means of transmission for the organisms.

SOURCE

The source of micro-organisms may be patients, visitors, or employees. The sources include persons with active diseases - in the incubation period of the disease, or persons who are colonized by the infectious agent, but have no apparent disease (carriers). Other potential sources include objects in the environment that have become contaminated.

HOST

Hospital patients are often more susceptible to infection than people in the community. Persons with diabetes or cancer, and those treated with certain antibiotics, steriods, or chemotherapy may be particularly prone to infection. Age, chronic diseases, shock, coma, or surgical procedures also make a person more susceptible.

TRANSMISSION

Micro-organisms are transmitted or spread by various routes. There are four main routes of transmission - contact, vehicle, airborne, and vectorborne (Figure 15.1).

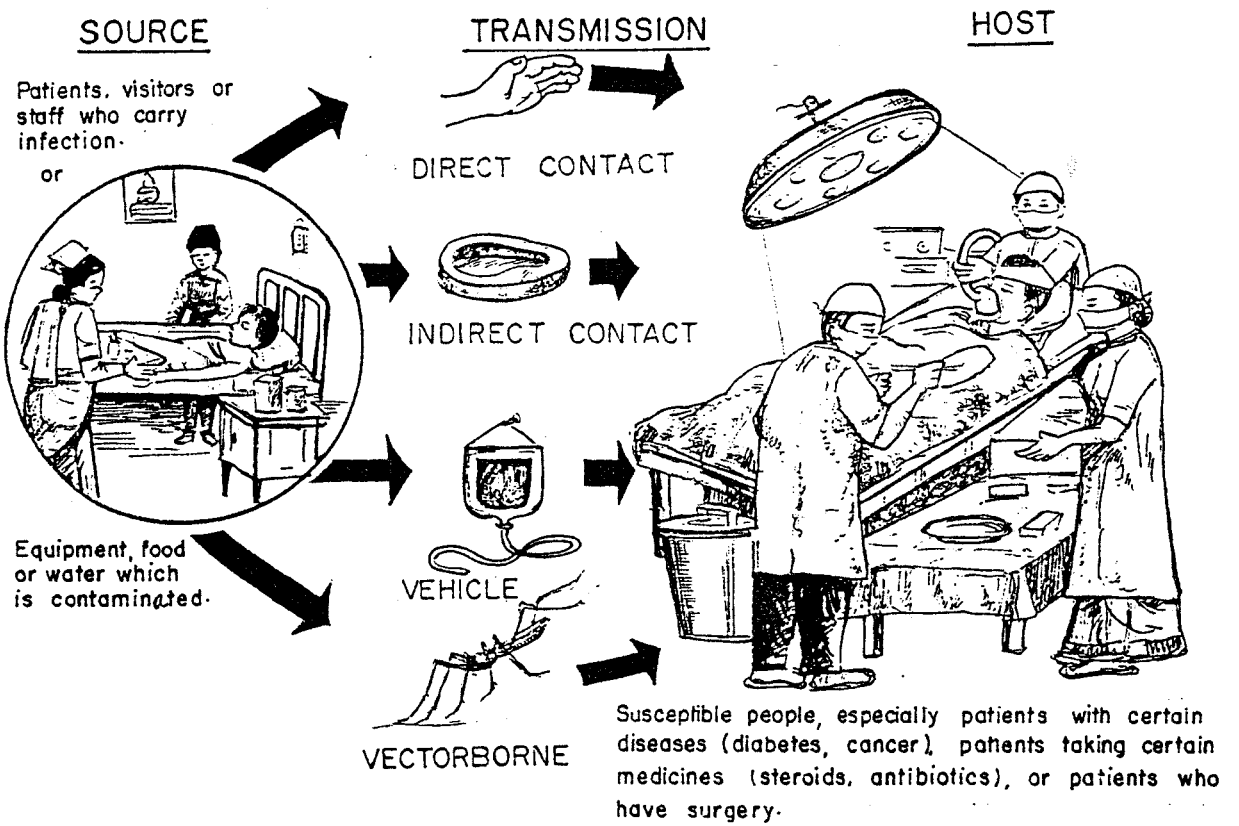
(1) Contact Route

Direct contact - direct physical transfer between a susceptible person and an infected person, such as between a patient and the hospital personnel during bedbaths, backrubs and dressing changes (e.g., Staphylococcal wound infection).

Indirect contact - personal contact by a susceptible person with contaminated objects, such as bed linen, instruments, bed-pans and dressings (e.g., Pseudomonas urinary tract infection).

Figure 15.1

ROUTES OF TRANSMISSION



(2) Vehicle Route

Transmission by contaminated foods (e.g., giardiasis), water (e.g., typhoid fever) or blood (e.g., hepatitis).

(3) Airborne route

Spread by either droplet nuclei (particles in the air resulting from coughing, sneezing, or talking by an infected person) or dust particles in the air containing micro-organisms. These particles are inhaled by, or deposited on, a susceptible person (e.g., tuberculosis).

(4) Vectorborne Route

Spread of micro-organisms by an animal, or an insect, such as a mosquito or a tick (e.g., malaria).

Following are the recommended guidelines to prevent transmission of micro-organisms from patient to patient, hospital personnel, and visitors. Based on the proceeding routes of transmission, isolation procedures are divided into six main categories:

1. Strict Isolation
2. Contact Isolation
3. Respiratory Isolation
4. Enteric Precautions
5. Drainage/Secretion Precautions
6. Blood/Body Fluid Precautions

Figure 15.2 lists the purpose, some example diseases, equipment and the procedure for each category. "Isolation" for patients highly susceptible to infection (e.g., severe burns, cancer patients) is also discussed. For a complete alphabetical list and information on all infections/diseases which require isolation, refer to Figure 15.3. See Figure 15.4 for a list of infections/diseases which do not require isolation.

Figure 15.2

REFERENCE TABLE FOR ISOLATION PRECAUTIONS

	Strict Isolation	Contact Isolation	Respiratory Isolation
PURPOSE	To prevent the spread of highly communicable diseases that are transmitted by both contact and airborne routes	To prevent the spread of micro-organisms through close or direct contact	To prevent the spread of micro-organisms through air (droplet transmission)
EXAMPLE OF DISEASES (For complete list, see Figure 15.3)	Diphtheria Plague Varicella (chickenpox)	Endometritis, Group A Streptococcus Impetigo Pneumonia, Staphylococcus or Group A Streptococcus Rabies Rubella Skin, wound, burn infections not contained by dressing	Measles Meningitis, bacterial (unknown) Haemophilus influenzae, Meningococal meningitis Mumps Pertussis (whooping cough) Tuberculosis
EQUIPMENT	Separate room required Gown Mask Gloves Soap and water Blood pressure cuff Thermometer Linen Germicidal agent	Separate room required Gown Mask Gloves Soap and water Blood pressure cuff Thermometer Linen Germicidal agent	Separate room required Mask Soap and water Germicidal agent

	Strict Isolation	Contact Isolation	Respiratory Isolation
PROCEDURE	Room - a separate room required with toilet and handwashing facilities (patients with the same disease may share a room) Gown, mask, and gloves - must be worn by all persons entering the room Handwashing - WASH HANDS BEFORE ENTERING AND AFTER LEAVING Blood pressure cuff, thermometer should remain in room with the patient Germicidal agent - all articles, instruments, needles, syringes used in the room, all linen and clothing, all dishes, should be soaked in appropriate germicidal agent in patient's room before routine processing (Figure 5.2)	Room - a separate room or cubicle with toilet and handwashing facilities (patients with the same disease may share a room) Gown - wear only if soiling likely Mask - wear if you come close to patients Handwashing - WASH HANDS BEFORE ENTERING AND AFTER LEAVING Gloves - wear if touching infective material Blood pressure cuff, thermometer - should remain in room with patient Germicidal agent - all articles, instruments, needles, syringes used in the room, all linen and clothing, dishes should be soaked in appropriate germicidal agent in patient's room before routine processing (Figure 5.2)	Room - a separate room or cubicle with hand-washing facilities (patients with the same disease may share a room) Mask - wear if you come close to patients Handwashing - WASH HANDS BEFORE ENTERING AND AFTER LEAVING Germicidal agent - articles, instruments contaminated with infective material should be soaked in appropriate germicidal agent in the room before routine processing (Figure 5.2)

	Enteric Precautions	Drainage/Secretion Precautions	Blood/Body Fluid Precautions
PURPOSE	To prevent the spread of micro-organisms that are transmitted by direct or indirect contact with faeces	To prevent cross-infection by micro-organisms that can be transmitted by direct or indirect contact with purulent material or drainage from an infected body site	To prevent infections that are transmitted by direct or indirect contact with blood or body fluids
EXAMPLE OF DISEASES (For complete list see Figure 15.3)	Amoebic dysentery Cholera Hepatitis, Type A Poliomyelitis Salmonella, Shigella gastro-enteritis Typhoid fever	Burn, wound, or skin infection if contained by dressing Conjunctivitis Decubitus ulcer, infected, if contained by dressing Gas gangrene	Acquired Immuno-deficiency Syndrome (AIDS) Arthropodborne viral fevers (e.g., dengue) Hepatitis, non-A, non-B Malaria Syphilis
EQUIPMENT	Separate room desirable Gown Gloves Soap and water Germicidal agent	Separate cubicle desirable Gown Gloves Soap and water Germicidal agent	Separate cubicle desirable Gown Gloves Soap and water Germicidal agent IV bottle for needles, sharps

	Enteric Precautions	Drainage/Secretion Precautions	Blood/Body Fluid Precautions
PROCEDURE	Room - a separate room or cubicle, with toilet and handwashing facilities, needed if patient hygiene is poor (patients with the same disease may share a room) Gown - wear, if soiling is likely Gloves - wear, if touching infective material (faeces) Handwashing - WASH HANDS AFTER TOUCHING PATIENT OR INFECTIVE MATERIAL AND BEFORE TAKING CARE OF ANOTHER PATIENT Germicidal agent - all articles contaminated with infective material should be soaked in appropriate germicidal agent before routine (Figure 5.2)	Room - private room not required Gown - wear, if soiling likely Gloves - wear, if touching infective material Handwashing - WASH HANDS AFTER TOUCHING PATIENT OR INFECTIVE MATERIAL (CONTAMINATED ARTICLES) AND BEFORE TAKING CARE OF ANOTHER PATIENT Germicidal agent - all articles contaminated with infective material should be soaked in appropriate germicidal agent (Figure 5.2)	Room - a separate room or cubicle with handwashing facilities is needed if patient hygiene is poor (patients with the same disease may share a room) Gown - wear if soiling with blood blood or body fluids likely Gloves - wear if touching blood or body fluids Handwashing - WASH HANDS IMMEDIATELY IF POTENTIALLY CONTAMINATED WITH BLOOD OR BODY FLUIDS AND BEFORE TAKING CARE OF ANOTHER PATIENT Needles - avoid needle-stick injuries. Place needles in puncture-resistant container, such as a used IV bottle. Germicidal agent - soak articles contaminated with blood or body fluids in appropriate germicidal agent (Figure 5.2) Spills - Blood spills should be cleaned up promptly with 0.5-1% bleach.

Figure 15.3

CATEGORY SPECIFIC ISOLATION PRECAUTIONS

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Abscess, etiology unknown Draining Not draining	Drainage/Secretion Precautions None	Variable Variable	Pus	Duration of illness
Acquired immuno-deficiency syndrome (AIDS)	Blood/Body Fluid Precautions	Unknown	Blood and Body Fluids	Duration of illness
Amoebiasis Dysentery Liver abscess	 Enteric Precautions None	 5 days - ? months 5 days - ? months	 Faeces	 Duration of illness
Anthrax Cutaneous Inhalation	 Drainage/Secretion Precautions Drainage/Secretion Precautions	 1-7 days 1-7 days	 Pus Respiratory Secretions, may be	 Duration of illness Duration of illness
Anthropodborne viral fevers (dengue, yellow fever, Colorado tick fever)	Blood/Body Fluid Precautions	Variable	Blood	Duration of hospitalization

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Bronchiolitis, etiology unknown in infants and young children	Contact Isolation	Variable	Respiratory Secretions	Duration of illness
Bronchitis, infective, etiology unknown				
Adults	None	Variable		
Infants and young children	Contact Isolation	Variable	Respiratory secretions	Duration of illness
Brucellosis (undulant fever, Malta fever, Mediterranean fever)				
Draining lesions	Drainage/Secretion Precautions	5 days - 9 months	Pus	Duration of illness
Other	None	5 days - 9 months		
Burn wound				
Major - not contained by dressing	Contact Isolation	Variable	Pus	Duration of illness
Minor - contained by dressing	Drainage/Secretion Precautions	Variable	Pus	Duration of illness
Campylobacter gastroenteritis	Enteric Precautions	1-10 days	Faeces	Duration of illness

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Cellulitis				
Draining	Drainage/Secretion Precautions	Variable	Pus	Duration of illness
Intact skin	None	Variable		
Chickenpox (varicella)	Strict Isolation	13-21 days	Respiratory secretions and lesion secretions	Until all lesions are crusted
Chlamydia trachomatis infection				
Conjunctivitis	Drainage/Secretion Precautions	5-12 days	Purulent exudate	Duration of illness
Genital	Same	5-12 days	Genital discharge	Duration of illness
Respiratory	Same	5-12 days	Respiratory secretions	Duration of illness
Cholera	Enteric Precautions	6 hours-5 days	Faeces	Duration of illness
Closed cavity infection				
Draining	Drainage/Secretion Precautions	Variable	Pus	Duration of illness
Not draining	None	Variable		

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Clostridium perfringens				
Food poisoning	None	6-24 hours		
Gas gangrene	Drainage/Secretion Precautions		Pus	Duration of illness
Other	Drainage/Secretion Precautions		Pus	Duration of illness
Common cold				
Adults	None	Few days		
Infants and young children	Contact Isolation	1 week+	Respiratory Secretion	Duration of illness
Congenital rubella	Contact Isolation	0-21 days	Urine and respiratory secretions	During any admission for the 1st year after birth
Conjunctivitis, acute bacterial (sore eye, pink eye)	Drainage/Secretion Precautions	Variable (usually 1-3 days)	Purulent exudate	Duration of illness
Conjunctivitis, gonococcal				
Adults	Drainage/Secretion Precautions	1-5 days	Purulent exudate	For 24 hours after start of effective therapy
Newborns	Contact Isolation	1-5 days	Purulent exudate	For 24 hours after start of effective therapy

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Conjunctivitis, viral and etiology unknown (acute hemorrhagic and swimming pool conjunctivitis)	Drainage/Secretion Precautions	5-12 days	Purulent exudate	Duration of illness
Creutzfieldt-Jakob disease	Blood/Body Fluid Precautions	Probably upto 30 years	Blood, brain tissue, and spinal fluid	Duration of hospitalization
Group	Contact Isolation	Few days - 1+ weeks	Respiratory Secretions	Duration of illness
Decubitus ulcer, infected	Drainage/Secretion Precautions	Variable	Pus	Duration of illness
Dengue	Blood/Body Fluid Precautions	3-15 days	Blood	Duration of hospitalization
Diarrhoea, acute-infective etiology suspected	Enteric Precautions	Variable	Faeces	Duration of illness

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Diphtheria				
Cutaneous	Contact Isolation	1-7 days	Lesion secretions	Until cultures from skin lesions taken after cessation of antimicrobial therapy are negative for C.diphtheriae.
Pharyngeal	Strict Isolation	1-7 days	Respiratory secretions	Until cultures from both nose and throat taken after cessation of antimicrobial therapy are negative for C.diphtheriae.
Ebola - Marburg virus disease	Strict Isolation	2-21 days	Blood, body fluids and respiratory secretions	
Eczema vaccinatum (vaccinia)	Contact Isolation	5-17 days	Lesion secretions	Duraton of Illness
Encephalitis, or encephalomyelitis, etiology unknown, but infection suspected	Enteric Precautions	Variable	Faeces	Duration of Illness, or 7 days after onset, whichever is less
Endometritis				
Group A Streptococcus	Contact Isolation	1-3 days	Vaginal discharge	For 24 hours after start of effective therapy
Other	Drainage/Secretion Precautions	Variable	Vaginal Discharge	Duration of Illness

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Enterocolitis				
Clostridium difficile	Enteric Precautions	Variable	Faeces	Duration of illness
Staphylococcus	Enteric Precautions	Variable	Faeces	Duration of illness
Enteroviral infection	Enteric Precautions	24-48 hours	Faeces	For 7 days after onset
Epiglottitis, due to Haemophilus influenzae	Respiratory Isolation	1-4 days	Respiratory secretions	For 24 hours after start of effective therapy
Erythema infectiosum	Respiratory Isolation	Variable	Respiratory secretions	For 7 days after onset
Escherichia coli gastroenteritis	Enteric Precautions	5-72 hours hours	Faeces	Duration of hospitalization
Food poisoning				
Salmonellosis	Enteric Precautions	5-72 hours (see typhoid fever)	Faeces	Duration of illness
Furunculosis, staphylococcal				
Newborns	Contact Isolation	4-10 days	Pus	Duration of illness
Others	Drainage/Secretion Precautions	4-10 days	Pus	Duration of illness

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Gangrene - gas gangrene due to any bacteria	Drainage/Secretion Precautions	Variable	Pus	Duration of illness
Gastroenteritis				
Campylobacter species	Enteric Precautions	1-10 days	Faeces	Duration of illness
Clostridium difficile	Same	Variable	Faeces	Duration of illness
Dietamoeba fragilis	Same	3-4 weeks	Faeces	Duration of illness
Escherichia coli	Same	5-72 hours	Faeces	Duration of illness
Giardia lamblia	Same	1-4 weeks	Faeces	Duration of illness
Salmonella species	Same	5-72 hours	Faeces	Duration of illness
Shigella species	Same	7-48 weeks	Faeces	Until cultures of faeces taken after ending antimicrobial therapy are negative for infecting strain
Unknown etiology	Same	Variable	Faeces	Duration of illness
Vibrio parahaemolyticus	Same	4-28 hours	Faeces	Duration of illness
Viral	Same	24-48 hours	Faeces	Duration of illness
Yersinia enterocolitica	Same	24-36 hours	Faeces	Duration of illness
German measles (rubella) (see also congenital rubella)	Contact Isolation	4-21 days	Respiratory secretions	For 7 days after onset of rash

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Giardiasis	Enteric Precautions	1-4 weeks	Faeces	Duration of illness
Gonococcal ophthalmia neonatorum (gonorrheal ophthalmia, acute conjunctivitis of the newborn)	Contact Isolation	1-5 days	Purulent exudate	For 24 hours after start of effective therapy
Hand, foot and mouth disease	Enteric Precautions	3-5 days	Faeces	For 7 days after onset
Haemorrhagic fevers (for example, Lassa fever)	Strict Isolation	Variable	Blood, body fluids, and respiratory secretions	Duration of illness
Hepatitis, viral				
Type A (infectious)	Enteric Precautions	2-7 weeks	Faeces, may be for 7 days after onset of jaundice	
Type B (serum), including hepatitis B antigen (HBsAg) carrier	Blood/Body Fluid Precautions	7-26 weeks	Blood and body fluids	Until patient is HBsAg - negative
Non-A, Non-B	Blood/Body Fluids Precautions	Unknown	Blood and body fluids	Duration of illness
Unspecified, consistent with viral etiology	Maintain precautions indicated for the infections that are most likely			
Herpangia	Enteric Precautions	3-5 days	Faeces	For 7 days after onset

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Herpes simplex				
Encephalitis	None	1-14 days		
Eucocutaneous, disseminated or primary, severe (skin, oral and genital)	Contact Isolation	1-14 days	Lesion secretions from infected site	Duration of illness
Mucocutaneous, recurrent (skin, oral and genital)	Drainage/Secretion Precautions	Reactivation of Herpes virus	Lesion secretions from infected site	Until all lesions are crusted
Neonatal	Contact Isolation	0-14 days	Lesion secretions	Duration of illness
Herpes zoster (varicella zoster)				
Disseminated	Strict Isolation	Reactivation of chickenpox virus	Lesion secretions and possibly respiratory secretions	Duration of illness
Localized	Drainage/Secretion Precautions	Same	Lesion secretions	Until all lesions are crusted
Impetigo	Contact Isolation	1-10 days	Lesions	For 24 hours after start of effective therapy
Influenza				
Adults	None	24-72 hours		
Infants and young children	Contact Isolation	24-72 hours	Respiratory secretions	Duration of illness

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Jakob-Creutzfeldt disease	Blood/Body Fluid Precautions	Probably upto 30 years	Blood, Brain tissue, and spinal fluid	Duration of hospitalization
Keratoconjunctivitis, infective	Drainage/Secretions Precautions	5-12 days	Purulent exudate	Duration of illness
Lassa fever	Strict Isolation	7-14 days	Blood, body fluids, and respiratory secretions	Duration of illness
Leptospirosis	Blood/Body Fluid Precautions	4-19 days	Blood and urine	Duration of hospitalization
Lice (pediculosis)	Contact Isolation	Immediate (eggs hatch after 1 week)	Infested area	For 24 hours after start of effective therapy
Malaria	Blood/Body Fluid Precautions	8 days - 3 years	Blood	Duration of illness
Marburg virus disease (also Ebola-Marburg Virus disease)	Strict Isolation	3-7 days	Blood, body fluids, and respiratory secretions	Duration of illness
Measles (rubeola)	Respiratory Isolation	9-14 days	Respiratory secretions	For 4 days after start of rash

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Meningitis				
Aseptic (non-bacterial or viral meningitis)	Enteric Precautions	Variable	Faeces	For 7 days after onset
Bacterial, gram-negative in neonates	None	Variable	Faeces, may be	
Fungal	None	Variable		
Haemophilus influenzae, known or suspected	Respiratory Isolation	2-4 days	Respiratory secretions	For 24 hours after start of effective therapy
Listeria monocytogenes	None	Probably 4 days - 3 weeks		
Neisseria meningitidis (meningococcal), known or suspected	Respiratory Isolation	2-10 days	Respiratory secretions	For 24 hours after start of effective therapy
Pneumococcal	None	Probably 1-3 days		
Tuberculous	None	Variable (probably 4-12 weeks)		
Other bacterial	None	Variable		
Meningococcal pneumonia	Respiratory Isolation	2-10 days	Respiratory secretions	For 24 hours after start of effective therapy
Meningococcemia (meningococcal sepsis)	Respiratory Isolation	2-10 days	Respiratory secretions	For 24 hours after start of effective therapy

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Multiple-resistant organisms, infection or colonization				
Gastrointestinal	Contact Isolation	Variable	Faeces	Until off antimicrobials and culture negative
Respiratory	Same	Variable	Respiratory secretions	Same
Skin, wound or burn	Same	Variable	Pus and possibly faeces	Same
Urinary	Same	Variable	Urine and possibly faeces	Same
Mumps	Respiratory Isolation	14-28 hours	Respiratory secretions	For 9 days after onset of swelling
Mycobacteria, non-tuberculous (atypical)				
Pulmonary	None	Variable		
Wound	Drainage/Secretion Precautions	Variable	Drainage, may be	Duration of illness
Necrotizing enterocolitis	Enteric Precautions	Variable	Faeces, may be	Duration of illness
Pediculosis (lice)	See Lice (pediculosis)			
Pertussis (whooping cough)	Respiratory Isolation	7-21 days	Respiratory Secretions	For 7 days after start of effective therapy

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Pharyngitis, infective, etiology unknown				
Adults	None	Variable		
Infants and children	Contact Isolation	Variable	Respiratory Secretions	Duration of illness
Plague				
Bubonic	Drainage/Secretion Precautions	2-6 days	Pus	For 3 days after start of effective therapy
Pneumonic	Strict Isolation	2-4 days	Respiratory Secretions	For 3 days after start of effective therapy
Pneumonia				
Bacterial	None unless otherwise listed below			
Chlamydia	Drainage/Secretion Precautions	4-15 days	Respiratory Secretions	Duration of illness
Haemophilus influenzae, infants and children only	Respiratory Isolation	1-4 days	Respiratory Secretions	For 24 hours after start of effective therapy
Meningococcal	Respiratory Isolation	2-10 days	Respiratory secretions	For 24 hours after start of effective therapy
Multiple-resistant bacterial	Contact Isolation	Variable	Respiratory Secretions and possibly faeces	Until off antimicrobials and culture-negative

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Pneumonia (cont'd.)				
Staphylococcus aureus	Contact Isolation	Variable	Respiratory Secretions	For 48 hours after start of effective therapy
Streptococcus Group A	Contact Isolation	1-3 days	Respiratory Secretions	For 24 hours after start of effective therapy
Viral				
Adults	None	Variable		
Infants	Contact Isolation	Variable	Respiratory Secretions	Duration of Illness
Poliomyelitis	Enteric Precautions	3-21 days	Faeces	For 7 days after onset
Rabies	Contact Isolation	2 weeks - 12 months	Respiratory Secretions	Duration of Illness
Rat-bite fever (Streptobacillus monoliformis	Blood/Body Fluid Precautions	3-12 days	Blood	For 24 hours after start of effective therapy
Relapsing fever	Blood/Body Fluid Precautions	3-12 days	Blood	Duration of Illness
Respiratory infectious disease, acute				
Adults	None unless covered elsewhere			
Infants and young children	Contact Isolation	Variable	Respiratory Secretions	Duration of Illness

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Ritter's disease (staphylococcal scalded skin syndrome)	Contact Isolation	4-10 days	Lesion drainage	Duration of illness
Rubella (German measles) (see also congenital rubella)	Contact Isolation	4-21 days	Respiratory Secretions	For 7 days after onset of rash
Salmonellosis (see Typhoid fever)	Enteric Precautions	58-72 hours	Faeces	Duration of illness
Scabies	Contact Isolation (no mask)	2-6 weeks (1-4 days after re-exposure	Infested area	For 24 hours after start of effective therapy
Scalded skin syndrome, Staphylococcal	(see Ritter's disease)			
Shigellosis	Enteric Precautions	1-7 days	Faeces	Until cultures of faeces, taken after ending antimicrobial therapy, are negative for infecting strain
Smallpox (variola)	Strict Isolation	7-16 days	Respiratory Secretions and lesion secretions	Duration of illness
Spirillum minus disease	(see Rat-bite fever)			

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Staphylococcal disease				
Skin, wound, or burn infection				
Major (dressing does not cover)	Contact Isolation	4-10 days	Pus	Duration of illness
Minor (dressing covers)	Drainage/Secretions Precautions	4-10 days	Pus	Duration of illness
Enterocolitis	Enteric Percautions	Variable	Faeces	Duration of illness
Pneumonia or draining lung abscess	Contact Isolation	Variable	Respiratory Secretions	For 48 hours after start of effective therapy
Scalded skin syndrome	Contact Isolation	4-10 days	Lesion drainage	Duration of illness
Toxic shock syndrome	Drainage/Secretions Precautions	Variable	Vaginal discharge of pus	Duration of illness
Streptobacillus moniliformis	(see Rat-bite fever)			
Streptococcal disease (Group A Streptococcus)				
Skin, wound, or burn infection				
Major (dressing does not cover)	Contact Isolation	1-3 days	Pus	For 24 hours after start of effective therapy
Minor (dressing covers)	Drainage/Secretions Precautions	1-3 days	Pus	For 24 hours after start of effective therapy
Endometritis (puerpural sepsis)	Contact Isolation	1-3 days	Vaginal discharge	For 24 hours after start of effective therapy

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Streptococcal disease (Group A Streptococcus) Skin, wound, or burn infection (cont'd)				
Pharyngitis	Drainage/Secretions Precautions	1-3 days	Respiratory Secretions	For 24 hours after start of effective therapy
Pneumonia	Contact Isolation	1-3 days	Respiratory Secretions	For 24 hours after start of effective therapy
Scarlet fever	Drainage/Secretion Precautions	1-3 days	Respiratory Secretions	For 24 hours after start of effective therapy
Syphilis				
Skin and mucous membrane, including congenital, primary and secondary	Drainage/Secretion Precautions and Blood/ Body Fluid Precautions	10-70 days	Lesion Secretions and blood	For 24 hours after start of effective therapy
Latent (tertiary) with sero-positivity without lesions	None	Variable		
Toxic shock syndrome (staphylococcal disease)	Drainage/Secretion Precautions	Variable	Vaginal discharge	Duration of illness
Trachoma, acute	Drainage/Secretion Precautions	5-12 days	Purulent exudate	Duration of illness

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Tuberculosis				
Extrapulmonary, draining lesion	Drainage/Secretion Precautions	4-12 weeks	Pus	Duration of illness
Extrapulmonary, meningitis	None	4-12 weeks		
Pulmonary, confirmed or suspected	Respiratory Isolation	4-12 weeks	Airborne droplet nuclei	For 3 weeks after start of effective therapy (for INH-resistant strains, until patient is improving and sputum smear negative for acid-fast bacilli)
Skin-test positive with no evidence of pulmonary disease	None	Not related		
Tularemia				
Draining lesion	Drainage/Secretion Precautions	2-10 days	Pus, may be	Duration of illness
Pulmonary	None	2-10 days		
Typhoid fever	Enteric Precautions	1-3 weeks	Faeces	Duration of illness
Vaccinia				
At vaccination site	Drainage/Secretion Precautions	5-17 days	Lesion	Duration of illness
Generalized and progressive, eczema vaccinatum	Contact Isolation	5-17 days	Lesion	Duration of illness

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Varicella	(see Chickenpox)			
Variola	(see Smallpox)			
Vibrio parahaemolyticus gastroenteritis	Enteric Precautions	2-48 hours	Faeces	Duration of illness
Viral diseases				
Pericarditis, myocarditis, or meningitis	Enteric Precautions	Variable	Faeces and, possibly respiratory secretions	For 7 days after onset
Respiratory (if not covered elsewhere)				
Adults	None	Variable		
Infants and young children	Contact Isolation	Variable	Respiratory secretions	Duration of illness
Whooping cough (Pertussis)	Respiratory Isolation	1-3 weeks	Respiratory Secretions	For 7 days after start of effective therapy
Wound Infection				
Major (not contained by dressing)	Contact Isolation	Variable	Pus	Duration of illness
Minor (contained by dressing)	Drainage/Secretion Precautions	Variable	Pus	Duration of illness

Disease	Category	Incubation Period	Infective Material	Duration of Precautions
Yersinia enterocolitica gastroenteritis	Enteric Precautions	24-36 hours	Faeces	Duration of illness
Zoster (varicella-zoster)				
Disseminated	Strict Isolation	Reactivation of chickenpox virus	Lesion secretions	Duration of illness
Localized	Drainage/Secretion Precautions	Same	Lesion Secretions	Until all lesions are crusted

Figure 15.4

DISEASES FOR WHICH NO ISOLATION PRECAUTIONS ARE REQUIRED

(Listed Alphabetically)

*Abscess, NOT draining
Actinomycosis, all lesions
*Amoebiasis, liver abscess only
Arthropodborne viral encephalitis
Ascariasis
Aspergillosis

Blastomycosis
Botulism, infant or other
*Bronchitis, infective, etiology unknown, adults only
*Brucellosis, NO draining lesions

Candidiasis, all forms, including moniliasis and thrush
Cat-scratch fever
*Cellulitis, intact skin only
Chancroid (soft chancre)
*Closed-cavity infection, NOT draining
*Clostridium perfringens, food poisoning only
Coccidioidomycosis, all forms
*Common cold, adults only
Cryptococcus
Cysticerosis

Echinococcosis (hydatidosis)
Enterobiasis (pinworm disease)
Epstein-Barr virus infection, any, including infectious mononucleosis
Erysipeloid

*Food poisoning - Botulism, Clostridium perfringens, Staphylococcal

Gonorrhea
Granulocytopenia
Granuloma inguinale (granuloma venereum)
Guillain-Barre syndrome

*Herpes simplex, encephalitis only
Histoplasmosis at any site
Hookworm disease

Immuno-compromised status
Infectious mononucleosis
*Influenza, adults only

Legionnaires disease
Leprosy
Listeriosis
Lyme disease
Lymphocytic chorio-meningitis
Lymphogranuloma venereum

Melioidosis, all forms
*Meningitis - bacterial gram-negative enteric in infants, fungal, listeria monocytogenes pneumococcal, tuberculous
Molluscum contagiosum
Mucormycosis
*Mycobacterium, non-tuberculosis, pulmonary only
Mycoplasma pneumonia

Neutropenia
Nocardiosis, any type

Orf

*Pharyngitis, etiology unknown adults only
Pinworm infection
*Pneumonia-gram-negative bacterial, fungal Haemophilus influenzae (adults only), legionella, primary atypical, pneumocystis, viral (adults only)
Psittacosis (ornithosis)

Q fever

*See Category Specific Isolation Precautions (Figure 15.3)

*Respiratory infectious disease, acute not covered elsewhere, (adults only)
Reye syndrome
Rheumatic fever
Rickettsial fevers, tick-borne (tickborne typhus)
Rickettsial pox
Ringworm
Rocky Mountain spotted fever
Roseola infantum

Schistosomiasis
Sporotrichosis
*Streptococcal disease (Group B Streptococcus) neonatal
Streptococcal disease NOT Group A or B, unless covered elsewhere
Strongyloidiasis

Tapeworm disease, any form
Tetanus
Tinea (fungus infection, dermatophytosis, dermatomycosis, ringworm)
Toxoplasmosis
Trench mouth (Vincent's angina)
Trichinosis
Trichomoniasis
*Tuberculosis-extra pulmonary, meningitis, skin-test, positive with no evidence of current pulmonary disease
*Tularemia-pulmonary only
Typhus, endemic and epidemic

Urinary tract infection, with or without catheter

Vincent's angina (trench mouth)
*Viral disease-respiratory adults only unless otherwise covered

Zygomycosis (phycomycosis-mucormycosis)

*See Category Specific Isolation Precautions (Figure 15.3)

Where ideal isolation facilities are not available, remember the following:

(1) To control respiratory contact:

- place the patients in a separate room or as far from other patients as possible;
- wear a mask or cloth over nose and mouth when you are close to the patient, and
- instruct the patient to cover mouth while coughing.

(2) To control direct contact:

- keep wounds covered;
- wash your hands thoroughly before and after each contact with the patients, and
- dispose of dressings, sputum, and body fluids in a safe manner (Chapter 10).

(3) To control indirect contact:

- keep isolated patient care items separate from other patients;
- wash all used equipment and linen properly, and
- wash your hands thoroughly before and after each contact with the patients.

(4) To control vectorborne contact:

- use mosquito nets for patients during mosquito seasons, and
- prevent standing water in health facility compound.

ALWAYS REMEMBER

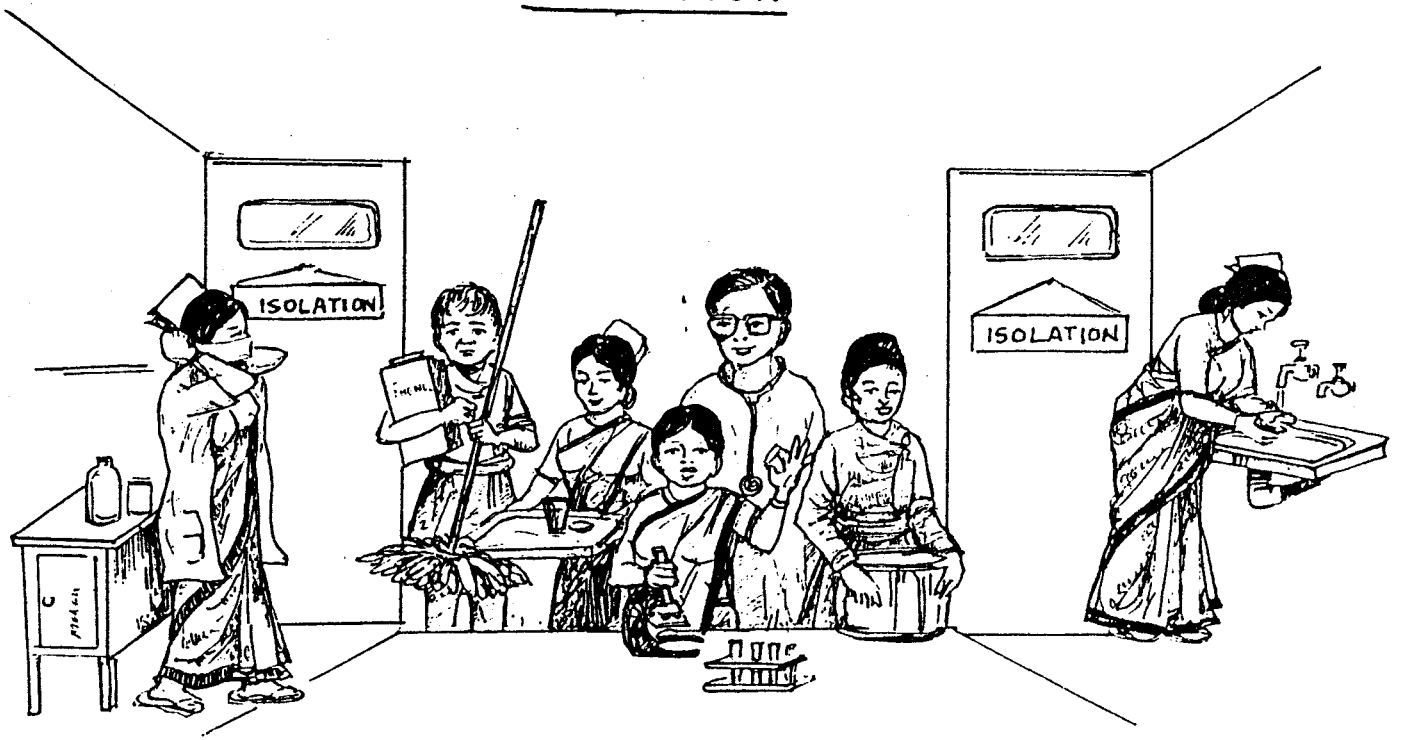
(1) It is safer to "over isolate" than to "under isolate". If a person is only suspected of having hepatitis or tuberculosis, place that person immediately in the appropriate isolation. Isolation during the early stage of a disease is often more effective (Figure 15.5).

(2) Isolation is effective only if **EVERYONE** follows the guidelines. All personnel - physicians, nurses, technicians, etc. - have a responsibility to comply with isolation precautions. Explain appropriate measures and reasons for isolation to the patient and the visitor.

(3) **HAND WASHING** is the single most important means of preventing the spread of infection (Figure 15.6).

Figure 15.5

ISOLATION

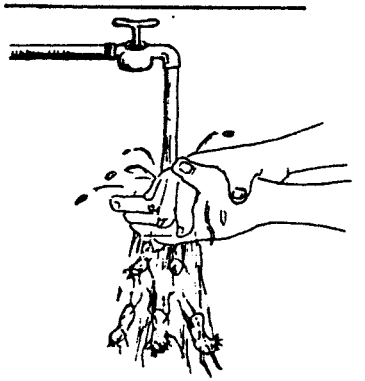


Remember

Isolation is only effective if *EVERYONE* follows the guidelines. *HAND WASHING* is the single most important way to prevent the spread of Infection.

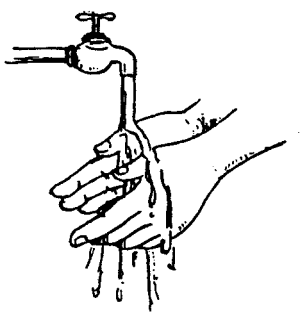
Figure 15.6

HAND WASHING

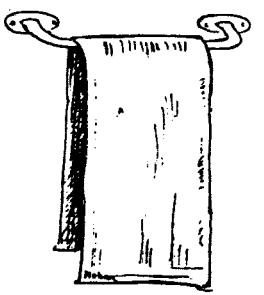


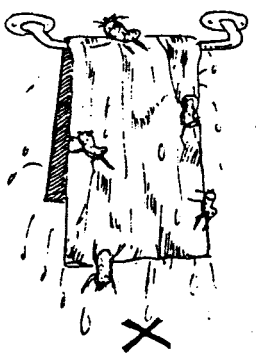
"Our Hero"

1. Vigorously wash hands with soap & running water; pay special attention to finer nails and spaces between fingers.



2. Rinse throughly under running water.





3. Dry carefully with clean dry towel.

ISOLATION FOR PATIENTS HIGHLY SUSCEPTIBLE TO INFECTION

Patients with certain diseases (e.g., leukemia, cancer, and extensive skin conditions, such as severe burns or dermatitis) and patients who are receiving certain therapy (e.g., total body irradiation, steriods, or chemotherapy) are highly susceptible to infection. For highly susceptible patients good patient-care techniques must be emphasized, be made practical and easy to do.

The following steps are recommended:

(1) Keep highly susceptible patients separate from patients who are infected, put them in private rooms, whenever possible. The room should be equipped with handwashing facilities.

(2) Emphasize routine techniques. All medical personnel must be constantly reminded to follow aseptic techniques at all times.

(3) All personnel must frequently and appropriately **WASH HANDS** before, during, and after patient care.

(4) Employees who are ill (e.g., cold) must **NOT** be assigned to care for the compromised patient.

Chapter 16

HEALTH OF STAFF OF HOSPITAL AND HEALTH POST
(Employees Health Service or Staff Infirmary)

In order to improve the health care of the staff of the hospital or the health post, the establishment of an Employees Health Service (EHS) or staff infirmary within the hospital is necessary. The purpose of this service is to detect, evaluate, prevent and treat infections and diseases in hospital personnel.

A practical way to provide these services to hospital employees is to have a full-time nurse (specifically, an adult nurse-midwife, ANM) to run the EHS with the assistance of a part-time doctor. The doctor would be available for consultation and to assist in the management of difficult illness or problems. The Employees Health Service should be open on a regular basis (for example: 10 a.m. to 4 p.m.). Routine physical examinations can be scheduled during that period of time. The nurse can also evaluate the staff who are ill or would become ill during the day, and refer them to the appropriate clinic or doctor. Arrangements should be made with the Emergency Room to see the staff during the night shift. Information about staff illness during the night should be left in the Emergency Room for the ANM to collect on a daily basis. An Employee Health Card should be prepared to identify each staff member of the hospital. The basic medical immunization information should be recorded on this card (see Figure 16.1).

The general purposes of the Employees Health Service include:

(1) Pre-employment Medical Evaluation

A routine pre-employment physical examination should be done for each employee of the hospital. The ANM can perform the physical examination and refer any problems to the part-time doctor for further evaluation of treatment. Attention should be directed specifically toward acute/chronic cutaneous, gastrointestinal, cardiovascular and respiratory infections, hepatitis, tuberculosis, diabetes, malignancy and other immunodeficient status.

(2) Immunization Programme

Immunizations, initial series and boosters, can be given to all employees by the ANM.

(3) Ongoing Medical Care

After the pre-employment or first physical examination, a routine physical examination should be carried out every two years to hospital employees. The Employees Health Service can also treat

and follow up any employee with a chronic health problem or sudden illness. The hospital should provide medications to all employees; the medications can be distributed through the EHS.

(4) Education

The ANM can do extensive health teaching to all hospital employees. Teaching should include prevention of illness, and information on infectious diseases and other health-related problems. Special emphasis should be given to prevention of accidents within the hospital. Common accidents are electrical burns, needle sticks and cuts caused by sharp objects, falls, slipping on spills, and back strain due to improper lifting of patients and equipment.

(5) Development of Policies and Procedures

Relevant personnel health policies and procedures can be developed through the EHS. For example, personnel who have direct contact with patients should be excused from duty when suffering from fever, from diarrhoea or from any apparent infection (Figure 16.2).

Figure 16.1

SAMPLE OF THE EMPLOYEE HEALTH CARD

HOSPITAL	IMMUNIZATIONS
Name of Staff Member:_____	Tetanus/Diphtheria (TD):
Address:_____	1st _____ Booster_____
Position:_____	2nd _____ 3rd _____
ID No.:_____	Typhoid:
Chronic Diseases:_____	1st _____ Booster_____
Medications_____	2nd _____
Allergies:_____	Meningococcal Meningitis Vaccine:
_____	1st _____ Booster_____
_____	Others:_____
_____	_____
Blood Type:_____	

Figure 16.2

EMPLOYEES HEALTH PROGRAMME

Some
PERSONAL TIPS

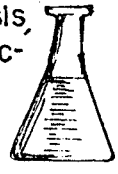
To keep you from spreading germs & to protect you from receiving them.

GET IMMUNIZATIONS

That are required or recommended.

HAVE PERIODIC TESTS

As needed for tuberculosis, hepatitis & others infections you might pick up and spread.



REPORT ANY ILLNESS

Such as a cold, flu, infected wound to your supervisor. What is minor for you could be serious or fatal for a patient. Don't report to work if you're sick.

STAY HEALTHY

With a balanced diet regular exercise & enough sleep. You'll be less likely to get infections & transmit them to others.

••• AND FOLLOW GOOD HABITS OF PERSONAL HYGIENE

- Bathe every day.
- Keep your hair clean.
- Tie up long hair while at work.
- Keep finger nails trimmed & clean.
- Wear a clean uniform every day.
- Leave your jewellery at home.

Chapter 17

PATIENT CARE PRACTICE

Certain invasive techniques, while providing the necessary technology for patient care, present added risk for nosocomial infection. Careful attention to detail is needed for the following procedures:

Urinary Tract (Foley catheters)

(1) Insert a catheter only when necessary and leave it in place only as long as necessary.

(2) Wash your hands immediately before and after any manipulations of catheter site or apparatus.

(3) Always insert a catheter with aseptic technique and sterile equipment.

(4) Secure the catheter after insertion to prevent movement.

(5) Use a sterile closed drainage system, all tubes are connected to a closed container. Never disconnect this system unless the catheter must be irrigated (doctor's order only).

(6) For specimen collection, use the distal end of the catheter or preferably a sampling port. Cleanse with disinfectant, then use a sterile needle and syringe.

(7) Be sure the flow is unobstructed - that the catheter has NO kinks, that the bag is below the bladder, that the drainage bag is emptied regularly, and that the spigot does not contact the collection device.

(8) Give meatal care with soap and water.

Respiratory

(1) Pre-operative - teach the importance of early ambulation, frequent coughing, and deep breathing.

(2) Wash your hands after contact with respiratory secretions; wash your hands <u>before</u> and <u>after</u> intubating a patient.

(3) Until a recent tracheostomy wound has had time to heal or form granulation tissue around the tube, use "no touch" technique or wear sterile gloves on both hands for all manipulation at the tracheostomy site.

(4) Suctioning - risk of cross-contamination and excessive trauma increases with frequent suctioning. Suction only as needed to reduce substantial secretions (audible "gurgling" sounds of increased respiratory difficulties).

(5) Suctioning - use "no touch" techniques or gloves on both hands.

(6) Use a sterile catheter for each series of suctioning.

(7) If flushing of catheter is required, use only sterile fluid.

(8) Always change the suction collection tubing (up to the canister) between patients.

Blood (Intravenous Therapy)

(1) Give intravenous therapy only for definite therapeutic or dianostic indications.

(2) Use a stainless steel needle, when possible.

(3) Wash your hands before handling the intravenous equipment or lines.

(4) Use upper extremities for intravenous therapy where possible (Figure 3.1).

(5) Scrub the site with an antiseptic - iodine, iodophor or alcohol.

(6) Secure the cannula at the insertion site to stabilize.

(7) Sterile dressing - change the intravenous therapy site and dressing every 48-72 hours.

(8) Evaluate, at least daily, for infectious complications related to the cannula and evaluate every 2-3 hours for other complications.

(9) Change intravenous tubing, including intravenous piggy back, every 48 hours.

(10) Maintain a closed system as much as possible; no tubes exposed to the air and all connected to a closed container.

(11) Change the entire system **immediately**, if purulent thrombophlebitis, cellulitis or intravenous-related blood infection is noted or strongly suspected.

(12) Intravenous solutions - once started must be completely used or discarded within 24 hours.

(13) Lipid emulsion - once started must be completely used or discarded within 12 hours.

Surgical Wound

(1) Pre-operative - scrub the area around and including the operative site with detergent solution followed by application of antiseptic solution. Any removal of hair should be minimal and done with clippers as near to the time of surgery as possible.

(2) Use a closed suction drainage system for the drainage of uninfected wounds.

(3) Wash your hands before and after taking care of the surgical wounds.

(4) Wear sterile gloves when touching open or fresh wounds.

(5) If the patient has symptoms of infection, fever, pain in the operative site, remove the dressing and inspect wound. Report symptoms, if present, to the attending physician.

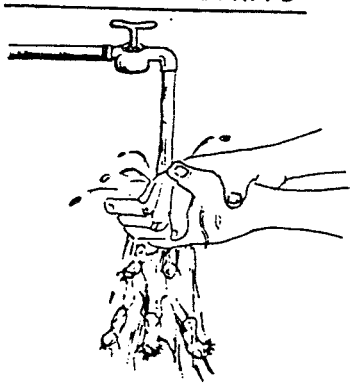
(6) Any drainage suspected of being infected should be cultured and a smear made for gram stain.

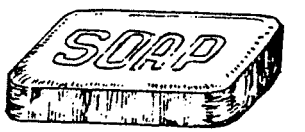
Remember

HANDWASHING is the single most important way to prevent infection (Figure 17.1).

Figure 17.1

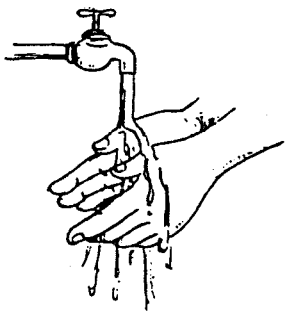
HAND WASHING



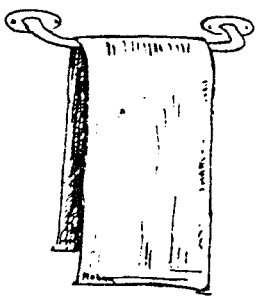


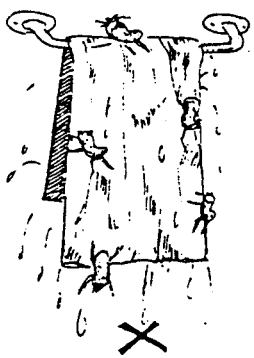
"Our Hero"

1. Vigorously wash hands with soap & running water; pay special attention to finger nails and spaces between fingers.



2. Rinse throughly under running water.





3. Dry carefully with clean dry towel.

Chapter 18

TEACHING ABOUT INFECTION CONTROL

An infection control programme can be successful only when everyone in the hospital or health post is involved. If a nurse forgets to wash her hands, if a patient coughs without covering his mouth, if a visitor uses the toilet or latrine improperly, infection may spread. Therefore each hospital and health post should plan educational programmes for staff, patients, and visitors.

An ongoing educational programme will provide the information necessary to help decrease the spread of micro-organisms to patients and staff. Topics on infection control programme might include handwashing, cleaning, disinfection and sterilization of equipment, catheter insertion, personal hygiene, and environmental cleaning (Figure 1.2). In addition, ongoing training programmes provide a forum for exchange of ideas between different levels of staff, patients and visitors. This kind of exchange, when individual ideas are given importance, can increase individual esteem among health facility staff, resulting in improved work attitudes, behaviour and productivity. Health facility staff, patients and visitors can work together to improve the health facility environment.

INFECTION CONTROL PROGRAMMES FOR STAFF, PATIENTS AND VISITORS

It is not possible to design a single teaching programme for all hospital personnel, patients, and visitors. Specific problems and hazards may differ with each group. However, the following basic educational objectives of the teaching programmes are similar for all people. Each person should be able to:

(1) understand the basic concepts as to how infection occurs and spreads;

(2) provide knowledge of the hazards associated with a particular job or duty;

(3) convince other employees, patients, or visitors that he has a personal responsibility and role in the control of infection;

(4) provide continuing education to others related to infection control, and

(5) reduce the risk of acquired infection for each patient and employee.

Make your educational programmes for a group or individual more effective by using discussions, audio-visual aids, posters, role play, and games. Consider establishing the following programmes in your hospital.

Orientation

Develop a routine programme to teach all new personnel the principles and methods for control of infection within their department, health post or hospital.

Continuing Education

Plan frequent programmes for all hospital personnel (medical, nursing, laboratory, dietary, housekeeping, and pharmacy). The programme must be presented in an understandable way. Provide practical and useful information needed to reduce the hazard of spreading infection. Always focus on the current problems in your hospital and how to control the outbreaks of infection.

Patient-Teaching

It is your responsibility to instruct each patient on his or her role in the prevention of infection. For example, teach patients with tuberculosis to cough into a handkerchief, teach patients with an enteric disease to thoroughly wash his or her hands before and after using the bathroom, teach a patient with a wound to keep it clean and dry, and teach all patients about the risks of drinking unboiled and unfiltered water. Use every opportunity to help the patients control the spread of infections.

Visitor Teaching

Make visitors aware of the risks they pose by spitting in halls, using latrines improperly, crowding around patients, and improperly handling intravenous sets, catheters, and other patient care equipment. **Use every oportunity to give one-on-one education in order to increase the visitors' knowledge about infection.** When visitors are waiting in the hospital, it is an excellent time to present mini-classes on infection control.

GUIDELINES FOR TEACHING INFECTION CONTROL

Teaching others to perform a task or change a behaviour, you do it all the time as you do your day-to-day work. Teaching others to do things has little to do with giving a long lecture or reading a book. Think of how mothers teach their daughters to cook. Think of how people learn to walk or swim or sing. Think of how you yourself learned some of these things.

Learning to do things happens in two ways:

- we learn from each other as we work together, and
- we learn through a training session or teaching programme.

How Can You Help Others Learn As You Work With Them?

In your day-to-day work with patients and other staff, there are many things you can do:

(1) Demonstrate the procedures correctly and explain why you do them in that manner. Always be an example or role model for others.

(2) Involve the other person in what you are doing. Say "let's do it together", rather than giving an order or command to them. Work **with** others, not on others!

(3) Be a listener. Encourage the other person to talk about what they are trying to do, and why they are doing it.

(4) Treat other persons with respect. Regard them as friends or partners. Demonstrate your own willingness to learn by asking help from others.

(5) Be encouraging, rather than being critical. **Avoid overwhelming the person with the weight of your authority or seniority.** Work together to identify what best can be done in the situation.

(6) Develop the type of relationship that makes others want to work with you.

(7) Know in your mind how you want to help others.

(8) Praise your colleagues when they do a good job.

(9) Use other meetings, such as staff conferences, to remind people about the procedures included in this manual.

(10) Make sure that infection control is considered when people meet to discuss other things.

REMEMBER THIS

- Don't just talk - **encourage** your trainees or students do the work.
- Include **practice** of tasks in a situation that is as similar to the job as possible.
- Before practice of the task, give learners **necessary** information and examples.

Provide	A Trainer may Use the Following Methods	A Learner Participates by
Information	- written or oral instructions - reading assignments in the text books or reference material - lectures	hearing or reading
Examples	- demonstrations - pictures or slides - written examples - films	seeing
Practice	- role-play exercises - supervised practice in the real work situation - written exercises	doing

- Give learners **feedback** on their practice so they will know how well they are doing a task and how they can improve.
- **Evaluate** training by watching learners do tasks on the job. If they still cannot do a task, find out why.
- Use the **results** of evaluation to improve training.

*Adapted from the WHO Training Manual for the Control of Diarrhoeal Diseases, Geneva, 1987

How Can You Help Others Through Training Sessions Or Educational Programmes?

There are some general steps you must take - whether your training programme is for your staff or for patients and visitors. These include:

(1) Plan the training carefully:

- Identify the group that is being trained;
- Describe the important tasks which these trainees must learn to do;
- Find out what the learners already know;
- Find out what tasks they are unable to do because they do not know how to do;
- Describe how each of these tasks should be done;
- Set clear objectives. Ask yourself, "What will the trainees be able to do after the training session?" Know what you want to achieve.

(2) Be realistic, and teach people to use facilities which are available.

(3) Seek help from staff members who have a lot of experience in working in hospitals and who know how to deal with the major issues.

(4) In planning your training, make sure that you pay attention to the development of appropriate positive attitudes in your staff members or patients and visitors. In order to develop appropriate attitudes:

- Give information about procedures and of consequences of not carrying them out (such as infection or even death);
- Encourage discussion about people's own attitudes towards cleanliness and cleaning the hospital or clinic environment;
- Link information about caring for patients and cleanliness in health facilities with local traditional and religious beliefs;
- Encourage hospital staff to recognize that a patient in a hospital needs their help to maintain their own personal cleanliness.

(5) Select appropriate teaching methods:

(a) Remember the Chinese proverb:

If I just hear, I forget.
If I see, I remember.
If I do, I understand.

(b) Make sure that you give the learners plenty of practice. Practice is always needed to learn to do a task.

(c) Use teaching aids to make learning more interesting. Teaching aids can include posters, pamphlets, flip-charts, role-plays and audio-visual equipment.

Some points to consider when preparing teaching aids:

- Keep training aids simple
- When using a teaching aid, be clear about how the aid will help the audience to whom you are presenting it
- Find out what training aids are available
- Make your own training aids, using local materials.

BIBLIOGRAPHY

1. Beneson, Abram S. CONTROL OF COMMUNICABLE DISEASES IN MAN, 13th edition, Washington, DC: The American Public Health Association, 1980.

2. Bennett, John V. et al. HOSPITAL INFECTIONS, Boston: Little, Brown and Company, 1979.

3. INFECTION CONTROL IN HOSPITAL, 4th edition, Chicago: American Hospital Association, 1979.

4. Perkins, John J. PRINCIPLES AND METHODS OF STERILIZATION IN HEALTH SCIENCES, 2nd edition, Springfield, Illinois: Charles C. Thomas, Publisher, 1982.

5. U.S. Department of Health and Human Services, Public Health Service. GUIDELINES FOR THE PREVENTION AND CONTROL OF NOSOCOMIAL INFECTIONS, 1981.

6. Lowbury, E.J.L. et al. CONTROL OF HOSPITAL INFECTION - A PRACTICAL HANDBOOK, 2nd edition, London: Chapman and Hall, 1981.

7. Association of Practitioners in Infection Control. THE APIC CURRICULUM FOR INFECTION CONTROL PRACTICE Volume 1, 2, United States of America: KENDALL/HUNT, 1983.

8. Technical Paper Service, Technology of Small Water Supply Systems in Developing Countries, WHO, Netherlands, 1981.