HOSPITAL

INFECTION CONTROL MANUAL

Sri Lanka College of Microbiologists

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HOSPITAL INFECTION CONTROL MANUAL

Sri Lanka College of Microbiologists

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FOREWORD

An Infection Control Manual for hospitals in Sri Lanka was a long felt need and I am indeed grateful to the Sri Lanka College of Microbiologists for taking the initiative in preparing this manual.

Infection control in hospitals is a widely discussed subject and is considered as an aspect of paramount importance in providing a better service for the wellbeing of patients.

Although Infection Control Committees have been set up in many hospitals and personnel to carry out these activities have been appointed, no comprehensive guidelines for hospitals in Sri Lanka were available up to date.

Therefore, I am sure that the Hospital Infection Control Manual prepared by the Sri Lanka College of Microbiologists would provide the necessary guidelines to formulate policies, procedures and evaluating mechanisms with regard to infection control, which in turn would help improve the wellbeing of patients, health care workers and visitors to hospitals.

Dr. H.A.P. Kahandaliyanage

Director General of Health Services

PREFACE

Prevention and control of Hospital Acquired Infections is a vital aspect of improving health care as these infections pose great hazards to patients as well as to health care workers and visitors. Although certain important steps have been taken during the past in this direction, no adequate guidelines for hospitals in Sri Lanka were available.

The Sri Lanka College of Microbiologists is proud to launch the Hospital Infection Control Manual, which would help in establishing and implementing necessary policies and procedures with regard to infection control. This manual was prepared after much discussion among Microbiologists as well as other relevant resource persons.

I wish to express my sincere gratitude to Professor Vasanthi Thevanesam, whose vision influenced us to prepare this manual, to Dr. Sujatha Mananwatte, Immediate Past President of SLCM, who initiated work on this manual during her tenure, to Dr. Kumudu Karunaratne and the Editorial Committee for their untiring and dedicated efforts in compiling and editing the manual and to all those members of the College who have contributed in many ways to make our dream a reality.

I am indebted to Dr. Athula Kahandaliyanage, Director General of Health Services, Dr. Ajith Mendis, Deputy Director General (Laboratory Services), Dr. Jayasundara Bandara, Director (Laboratory Services) and Dr. P.G.Mahipala , Director (Tertiary Care) for their continuing support extended to the College, and to the IDA / World Bank Health Sector Development Project for providing funds for the printing of this manual.

Dr. Ranjith Perera
President
Sri Lanka College of Microbiologists

CHAPTER 1

INFECTION CONTROL

CHAPTER 1

INFECTION CONTROL

INTRODUCTION

What is infection control?

Infection control is a series of procedures and guidelines to prevent hospital associated infections (HAI).

What are hospital associated infections (HAI)?

These are infections that are acquired by patients during their stay in hospital. Also infections that are acquired by health care workers while working in hospital. HAI are also known as nosocomial infections or hospital associated infections.

About 10-25% of patients acquire HAI during their stay in hospital. HAI are those infections that were neither present nor incubating at the time the patient was admitted to the health care facility and may appear even after the patient is discharged. The symptoms and signs of infection may appear while the patient is in hospital (usually more than 2 days after admission) or after the patient goes home after discharge. The patients who acquire HAI have to stay for longer in hospital, are treated with expensive antibiotics and have a high mortality.

HEALTHCARE EXPOSES PATIENTS TO THE RISK OF INFECTION.

What are the common HAI?

Common HAI are urinary tract infections, surgical wound infections and respiratory infections. Patients may also get gastrointestinal infections, bloodstream infections and infections at many other sites. Rarely Hepatitis B and HIV may also be acquired in hospital.

How are these infections transmitted?

HAI may be transmitted by health care workers to patients, from patient to patient and from patient to health care worker.

An important route of transmission of HAI is by direct contact from the hands of health care worker. Hospital bacteria from patients and from the hospital environment commonly colonize health care workers' hands. Most of these transient microorganisms are acquired from contact with heavily contaminated material such as body fluids but they can be acquired from apparently clean objects or surfaces such as patients' skin, bed linen and work surfaces. Hands may be contaminated by direct contact with patients or indirectly by handling equipment or through contact with the general environment.

If the health care worker attends to a patient and then touches another patient without washing their hands these hospital bacteria may be transmitted to the next patient by direct contact. HAI may also be transmitted by indirect contact. Here, the patient or health care worker contaminates the environment or instruments such as stethoscopes, thermometers etc. The pathogens in the environment or on the instruments are then transferred to the hands of the staff or onto other instruments and then to the next patient. The pathogens may be introduced directly into a site and cause infections (for example into a surgical wound) or they may colonize the patient's skin and cause infection later or become a source of infection to other patients. These transient microorganisms, located on the surface of the hands of healthcare workers, are easily removed by washing with soap and water.

HAI may also be transmitted by droplets and through the air and dust. Less commonly HAI are transmitted by food or water or by contaminated IV fluids or solutions.

HAI are often easily transmitted in the hospital because the patient's normal defenses of the skin and mucus membranes have been compromised. e.g catheterization or when IV cannulae are inserted or other devices are used.

HAI are specially common in units where there are very seriously ill patients such as intensive care units, special baby units, transplant units, burns units etc. *But they are transmitted in every type of ward in the hospital*.

Why is HAI a problem?

Many HAI are caused by hospital bacteria. These bacteria survive in the hospital because they are resistant to the commonly used antibiotics. These bacteria include methicillin resistant *Staphylococcus aureus* (MRSA), glycopeptide resistant enterococcus (GRE) and extended-spectrum beta-lactamase (ESBL) producing coliforms.

Because these bacteria are multi-drug resistant, the antibiotics used to treat them are often very expensive but may not be as effective as the usual antibiotics. Because of less effective treatment the duration of infection is often lengthened and the mortality is increased. The economic burden is high.

If these infections can be prevented, money can be saved and used to provide better treatment for patients.

What can we do to prevent these infections?

Many of these infections can be prevented by following a set of very simple, practical guidelines called STANDARD PRECAUTIONS (Chapter 3). These standard precautions should be followed by ALL health care workers in ALL patients at ALL times.

Infections due to device use can be minimized by using CLINICAL GUIDELINES (Chapter 7) when inserting and managing these devices.

The hospital environment and equipment should be kept safe by proper CLEANING, DISINFECTION AND STERILIZATION (Chapter 6). Hospital waste should be disposed of using proper WASTE MANAGEMENT (Chapter 11).

Infections in special care units may need a few more specialized guidelines for INFECTION CONTROL IN SPECIALIZED UNITS (Chapter 8) *in addition* to the Standard Precautions.

INFECTION CONTROL IN HEALTH CARE WORKERS (Chapter 12) includes training of staff on prevention of HAI by adopting safe work practices and management of staff who are exposed to infections at work.

How do we find out about these guidelines?

This manual has been developed as a resource to give basic information and guidance on infection control in a way that is practical and feasible in resource limited settings such as Sri Lanka.

CHAPTER 2

ORGANIZATION OF INFECTION CONTROL IN HOSPITALS

CHAPTER 2

ORGANIZATION OF INFECTION CONTROL IN HOSPITALS

INTRODUCTION

The organization of infection control in a hospital is very important for successful implementation of an infection control programme. A three tiered organization consisting of an Infection Control Committee (ICC), Infection Control Team (ICT) and Infection Control Practitioners would be one way of establishing a structure for planning, implementation and effective communication.

2.1. INFECTION CONTROL COMMITTEE (ICC)

The Infection Control Committee has 2 major responsibilities.

1. The ICC will be responsible for setting up Infection Control in the Hospital which will include developing a long term strategy as well as timely and effective action for acute problems such as outbreaks.
2. The ICC will be responsible for ensuring that the required infrastructure, including personnel and funding is made available for Infection Control activities within the hospital.

2.1.1. Composition of ICC

In order to facilitate the functions of the ICC, administration, finance, clinical staff, senior nursing staff, health education staff, occupational health staff will need to be part of the ICC. The ICC should not be too large as this will be ineffective, nor should it be too small and non representative as many issues relevant for effective infection control will not be addressed. A possible composition is given below but amendments to this could be made to suit local conditions.

- Medical Director / DMO or administrative Head of the Institution
- Microbiologist
- Infection Control Medical Officer
- Infection Control Nurse/s (ICN)
- One consultant representative from each of the clinical disciplines (medicine, surgery, paediatrics, obstetrics and gynaecology etc.)

- Administrative Officer for the Institution
- Finance Officer for the Institution
- Matron or representative and one senior nursing officer from each of the main sections of the hospital (OPD, medical wards, surgical wards, Paediatric wards, Obstetrics & Gynaecology, Theatres etc)
- Public health inspector (PHI)
- Occupational Health nurse (if any)
- Health Education staff
- Overseer
- Invite any other (eg. Regional Epidemiologist, Engineer, Pharmacist, Kitchen staff etc) as and when necessary.

2.1.2. Mandate for ICC

1. To determine IC issues in the hospital, prioritize them and set out policies and guidelines to deal with each issue
2. To enable sufficient resources to be made available for IC activities (personnel, funds, space and infrastructure, opportunities)
3. To respond to acute problems in IC in a timely and responsible fashion
4. To serve as a efficient means of communication in both directions - ie: grass roots to top administration and the reverse and where required to the public and other interested bodies
5. To ensure staff training
6. To ensure in-service training for the infection control team

2.1.3. Meetings

1. The ICC should appoint a Chairman who is responsible for
    - organization of the IC meetings
    - setting the agenda
    - ensuring minutes are circulated on time
    - chairing the meetings

The Chairman could be the hospital based Microbiologist, the Director/ DMO/ Administrative Head of the Hospital or any other consultant who is interested and reasonably knowledgeable about infection control.

2. The ICC should appoint a secretary who will prepare the minutes and inform all members of meetings. The secretary is usually a full time infection control nurse.
3. Meetings are best held every month and should last at least one hour.
4. The Agenda should be circulated previously and it is best if persons responsible for specific items prepare a short report on current status so that discussion could be focused.
5. Items on the Agenda could include
    - Specific policies and guidelines and their implementation
    - Surveillance (for MRSA , catheter related infections etc)
    - Audit of IC practice
    - Training programs and planning for them
    - Infrastructure requirements for IC
    - Specific infection control issues which may have arisen in the previous month

    It is important that the ICC meeting does not become a place where complaints are expressed by everyone with no plan of action to deal with them. It may be useful to have an initial 'brain-storming' meeting where all IC concerns are brought up and written down. These can then be prioritized and dealt with over a period of time. Some items (such as waste disposal) may remain on the agenda for several years whereas others, such as developing a training programme or setting up an audit for catheter related UTI would only remain as long as the issue is being dealt with.

6. Responsibility must be given to a specified person for each decision taken during the meeting. The IC Team (see below) would be the main executors of decisions. However, there would be occasion when other members of the committee would take responsibility for one or more items.

2.1.4. Annual Report of ICC

It is useful for the ICC to prepare an annual report of the year's activities outlining the following

- Members of committee
- Plan of action for year (which would include)
    - Infrastructure development
    - Training programme
    - Policies and guidelines which have been implemented
    - Audits and surveillance undertaken
    - Specific IC problems and their resolution
- What has been achieved over the year
- What has not been achieved over the year and reasons for same
- Funding requirements for year

2.2 INFECTION CONTROL TEAM (ICT)

2.2.1. Team members

- Microbiologist (if available)
- Infection Control Medical Officer (if available)
- Infection Control Nurses

2.2.2. Mandate

The ICT is the executor arm of the ICC and is responsible for the day to day activities of infection control in the hospital. The main areas of work of the ICT would include the following:

- Planning and carrying out training activities
- Surveillance and audit
- Regular visits to all wards and units for liaison, trouble shooting and communication
- Carry out the programme set out by the ICC

2.2.3. Meetings

Ideally the IC nurses and IC medical officer meet the microbiologist daily (briefly at least for 15 minutes) to plan the day and be informed about what is going on in the hospital. A longer once a week meeting of the ICT approximately an hour for which minutes are kept would be useful in ensuring that the work is on track and that problems are not being neglected. Reports which need to be prepared for the ICC meeting could be discussed at these meetings and responsibility for writing them be taken by different members of the team.

2.3. INFECTION CONTROL NURSE (ICN)

2.3.1. Lines of authority

Functional head of the ICC/ICT will be the Microbiologist and the team will work under the guidance of the Microbiologist.

One of the most important issues in running an effective Infection Control Programme in the hospital is the line management of the Infection Control Nurse. Often, in the absence of the ICC/ICT, this nurse is utilized for work which is not related to infection control. It is therefore very important that a proper line of authority be developed consisting of a nursing officer who is in the ICC and the Director or his/her representative, who ensure that the ICN stays focused on the Infection Control activities in the hospital. Any deviation from this must have the authorization of the ICC.

2.3.2. Functions of ICN

- Training (formal and informal)
- Implementing protocols and guidelines
- Surveillance and audit
- Trouble shooting on a daily basis

Communication to ICT and ICC of infection control problems on the ground.

CHAPTER 3

STANDARD PRECAUTIONS

CHAPTER 3

STANDARD PRECAUTIONS

INTRODUCTION

What are standard precautions?

They are a set of guidelines which should be followed to help reduce the transmission of HAI in hospitals. They should be used by **ALL** health care workers at **ALL** times when attending to **ALL** patients, regardless of their diagnosis or presumed infectious status. They are designed to reduce the risk of transmission of microorganisms from both recognized and unrecognized sources of infection in hospitals.

Do they replace universal precautions and body substance isolation?

Standard precautions *combines* ***universal precautions*** (UP) (which were developed to reduce the risk of blood borne infections) and ***body substance isolation*** (BSI) (which was developed to reduce the risk of transmission of resistant pathogens from moist body substances) into a set of simple, standardized guidelines to prevent transmission of all types of pathogens in the hospital setting.

How are they different from aseptic precautions?

Aseptic precautions are steps taken when entering a sterile body site, to prevent contamination of the site or of the specimens we are taking from that site (refer Chapter 4). For example, during surgery and during collection of blood for culture, pleural and peritoneal fluids and CSF. For aseptic precautions use sterile gloves.
For standard precautions sterile gloves are not necessary. Clean gloves are adequate.

In which patients are standard precautions used?

Standard precaution in all patients regardless of their diagnosis or presumed infection status so as to reduce the risk of transmission of microorganisms from healthcare worker to patient, patient to healthcare worker and patient to healthcare worker to patient.

To what body fluids do standard precautions apply?

Standard precautions apply to blood, all body fluids, secretions and excretions except sweat, non-intact skin and mucous membranes. Body fluids include CSF, pleural fluid, peritoneal fluid and amniotic fluid. Secretions include nasal secretions, sputum, tears and saliva. Excretions include faeces, urine and vomitus.

What are the protocols in standard precautions?

They are described in the next pages

3.1. HANDWASHING

The hands of health care workers are often colonized with hospital pathogens from patients and from environmental surfaces. Transfer of pathogens from patients to other patients or to the environmental surfaces occurs most commonly via the contaminated hands of health care workers. These bacteria are transient and can be greatly reduced in numbers by effective handwashing with soap and water. To prevent the transfer of microorganisms it is essential to wash hands *before* contact with any patient and *after* hands have become contaminated with microorganisms. Handwashing breaks the chain of infection transmission.

- Wash your hands before doing any invasive procedures and before handling any invasive devices.
- Wash your hands after contact with blood, body fluids, secretions or excretions and contaminated items irrespective of whether gloves were worn.
- Wash your hands immediately after gloves are removed.
- Wash your hands between patient contacts.
- Wash your hands between contact with 'dirty' and 'clean' sites on the same patient

Soap and water is used for routine hand washing to remove transient microorganisms. Nails must be clean and short. Remove watches and rings. Wet hands and apply soap on all surfaces of the hands. Rub hands systematically for 10-15 seconds covering all surfaces especially the tips of the fingers, the thumbs and the finger webs. Rinse hands thoroughly. Dry hands thoroughly using a single-use clean towel which is then sent to laundry for washing.

HANDWASHING IS THE SINGLE MOST IMPORTANT PROCEDURE FOR PREVENTING THE TRANSMISSION OF NOSOCOMIAL INFECTIONS.

For more information on hand hygiene refer chapter 5.

3.2. GLOVES

To prevent contamination of hands with microorganisms, gloves should be worn *when indicated*. Wearing gloves will also protect the patient from possible contamination with microorganisms from HCW hands. Sterile gloves are not necessary for protecting the HCW and the patient from HAI, clean gloves are adequate. Gloves must be discarded after each care activity for which they were worn in order to prevent the transmission of microorganisms to other patients.

- Wear clean gloves (STERILE GLOVES ARE NOT NECESSARY) when touching blood, body fluids, secretions or excretions and contaminated items
- Put on clean gloves immediately before touching mucous membranes and non-intact skin.
- Change gloves between contact with 'dirty' and 'clean' sites on the same patient.
- Remove gloves promptly after use and discard as clinical waste. Wash hands immediately, before touching non-contaminated items and environmental surfaces.
- Remove gloves promptly after use and wash your hands, before going to another patient.
- *Gloves are not a substitute for handwashing.*
- Ideally, gloves should not be washed and reused
- Use rubber heavy duty gloves for housekeeping chores involving potential blood contact and for instrument cleaning and decontamination procedures.

WEAR STERILE GLOVES WHEN PERFORMING ASEPTIC TECHNIQUES SUCH AS CATHETERISATION, LUMBAR PUNCTURE, BLOOD CULTURE AND INSERTING IN IV LINES.

3.3. PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE provides a protective physical barrier that reduces contamination of clothes, skin and the mucous membranes of the eyes, nose and mouth.

PPE includes gloves, mask, gown, apron, goggles, boots and caps. The mask should be a standard surgical splash proof mask *and not a gauze mask.*

HCW should asses the risk of exposure to blood, body fluids, excretions or secretions and should choose their items of PPE according to the risk.

Discard used PPE appropriately and wash hands after attending to patients.

- Wear a gown (a clean, non-sterile gown is adequate) and a plastic apron to protect the skin and to prevent soiling of clothing during procedures and patient care activities that are likely to generate splashes or sprays of blood, body fluids, secretions or excretions. Select a gown that is appropriate for the activity and the amount of fluid likely to be encountered.

- Wear a gown when caring for a patient with antibiotic resistant pathogens such as methicillin-resistant *Staphylococcus aureus* (MRSA) or glycopeptide resistant enterococci (GRE) to prevent contamination of clothing.

- Remove a soiled gown as promptly as possible, before leaving the patient's cubicle and discard into a bin lined with a yellow bag for soiled linen and wash hands to avoid transfer of microorganisms to other patients or environments.

- During procedures and patient care activities that are likely to generate splashes or sprays of blood, body fluids, secretions and excretions wear a mask and eye protection or a face shield to protect the mucous membranes of the eyes, nose and mouth.

3.4. PATIENT CARE EQUIPMENT

HAI may be transmitted by indirect contact. The patient or HCW contaminates equipment, then the pathogens on the equipment are transferred directly to the next patient or onto the hands of staff. The aim of decontaminating patient care equipment is to prevent pathogenic microorganisms reaching the next patient in sufficient numbers to cause infection.

- Ensure that single-use items are discarded properly and never re-used. (However, if such items have to be reused, cleaning and high level disinfection is recommended)
- Handle used patient care equipment soiled with blood, body fluids, secretions and excretions in a manner that prevents skin and mucous membrane exposures, contamination of clothing and transfer of microorganisms to other patients and environment.
- Ensure that reusable equipment is not used for the care of another patient until it has been cleaned and disinfected or sterilized appropriately.

3.4.1. Cleaning of instruments

Cleaning is the first step in the decontamination process. It must be carried out before disinfection and sterilization to make these processes effective.

- Thorough cleaning with GPD and water will remove most microorganisms.
- Wear personal protective equipment (plastic apron, heavy duty gloves)
- The sink should be deep enough to completely immerse the equipment.
- Remove any gross soiling on the instrument by rinsing in tap water.
- Take instrument apart fully and immerse all parts in warm water with detergent. Follow the manufacturer's instructions.
- Instrument should remain below the surface of the water while brushing and cleaning. Take precautions to prevent splash and injury.
- Ensure all visible soiling is removed from the instrument.
- Rinse in hot water (45^{o}C) unless contraindicated.
- Dry the instrument. Inspect to ensure the instrument is clean.
- Keep cleaning equipment (brushes and cloths) clean and dry between uses.

For more information on disinfection and sterilization refer chapter 6

3.5. ENVIRONMENTAL CONTROL

The environment plays a relatively minor role in transmitting infection but dust, dirt and liquid residues will increase the risk. They should be kept to a minimum by good design of buildings (to allow little dust build-up and allow easy cleaning) and by regular cleaning and inspection. The hospital environment should be visibly clean, free from dust and dirt and acceptable to patients, their visitors and staff.

- Ensure that the hospital has adequate procedures for the routine care, cleaning and disinfection of environmental surfaces, beds, bedrails, bedside equipment and other frequently touched surfaces and that they are being followed.
- Wet cleaning and damp dusting is preferable to prevent pathogens from being airborne from the surfaces that are being cleaned.
- Use general purpose detergent for environmental cleaning. Keep the environment dry, clean, well ventilated and exposed to sunlight. Do not use disinfectants unless indicated eg. spills, isolation rooms
- Keep mops and buckets clean, dry and inverted.
- Use different cleaning equipment for clinical areas, toilets and kitchens.
- Routine culturing of environment and air is not useful.
- No special precautions are needed for dishes, glasses, cups and eating utensils. Washing with soap and water is adequate.

3.5.1. Management of spills

Blood and body fluid spills

- Wear heavy duty gloves.
- Soak up fluid using absorbent material (paper towels, gauze, wadding).
- Pour 1% hypochlorite solution (10,000 ppm of available chlorine) till it is well soaked. Leave for at least 10 minutes.
- Remove the absorbent material and discard as clinical waste.
- Clean area with detergent and water and dry.
- Discard gloves as clinical waste.
- Wash hands.

Low risk body fluid spills eg. faeces, vomit, urine

- Wear gloves.
- Soak up fluid using absorbent material (paper towels, gauze, wadding).
- Clean area with detergent and water and dry thoroughly.
- Discard gloves as clinical waste.
- Wash hands.

For more information on cleaning and decontamination of the hospital environment refer chapter 6 and waste disposal refer chapter 11.

3.6. LINEN

- Handle, transport and process soiled linen so as to prevent skin and mucous membrane exposures and contamination of clothing.
- Ideally blood and body fluid stained linen and linen from patients in contact isolation should be washed in a washing machine with a hot cycle using bleach. Alternatively they should be soaked in 0.5-1% hypochlorite solution for 30 minutes in the wards/operation theatre before sending to the laundry.
- Bed linen should be changed on discharge of a patient or if it becomes soiled or contaminated. Every patient should have clean bed linen.
- Curtains should be washed on a scheduled basis.

For more information on linen handling refer Chapter 6.

3.7. OCCUPATIONAL HEALTH AND BLOODBORNE PATHOGENS

Health care workers may be at risk of acquiring infections during their work. Work practices should be adopted to minimize the risk of getting infected. Staff should be immunized against Hepatitis B.

3.7.1. Handling of sharps

- Avoid using sharps whenever possible.
- Sharps such as scalpels, lancets, needles and syringes should be *single use only*.
- Take care to prevent injuries when using, handling after procedures, cleaning and disposing of sharps.
- Avoid recapping used needles. If this is necessary use a one-handed "scoop" technique.
- Do not remove used needles from disposable syringes by hand.
- Do not bend, break or otherwise manipulate used needles by hand.
- Discard sharps directly into a 'sharps bin' which is located as close as practical to the area in which the items were used. Discard used sharps immediately and never leave them lying around.
- If the sharp bin is at a distance, the used sharp should be carefully carried to it on a tray.
- Dispose of the sharp container when it is ¾ full. Never let the sharp bin fill up more than ¾ full.
- Sharps must not be passed directly from hand to hand.
- Place reusable syringes and needles in a puncture resistant container for transport to the reprocessing area.
- Use clean gloves during phlebotomy to reduce blood contamination of hands.

3.7.2 Prevention of mucus membrane exposures

- Use mouthpieces, resuscitation bags or other ventilation devices as an alternative to mouth to mouth resuscitation methods in areas where the need for resuscitation is predictable.
- During procedures and patient care activities that are likely to generate splashes or sprays of blood, body fluids, secretions and excretions wear a mask and eye protection or a face shield to protect the mucous membranes of the eyes, nose and mouth.

3.7.3. Management of needle stick accident or mucous membrane exposure.

- Encourage bleeding from the wound.
- Wash wound with soap and water or irrigate the mucous membranes with copious amounts of water or saline.
- Report all exposures to Infection Control Team through ward sister

3.7.4. Collection and transport of specimens

- Place specimens in a leak-proof container.
- Do not contaminate the outside of the container.
- Store specimens away from food and drink.
- Transport securely to prevent spillage.

For more information on occupational health refer Chapter 12.

3.8. PATIENT ISOLATION

- Place a patient who could transmit infection in a private room or cohort him with other patients infected with the same microorganism.
- Clean gowns and gloves should be used when entering the room and removed before leaving the room. Wear masks if necessary.
- Wash hands before leaving the room.
- Such patients should not be transported to other areas of the hospital unless absolutely necessary.
- Limit the use of patient care equipment to patients in the isolation room only.

CHAPTER 4

ADDITIONAL PRECAUTIONS

CHAPTER 4

ADDITIONAL PRECAUTIONS

4.1. TRANSMISSION BASED PRECAUTIONS

The Microbiologist should be consulted before instituting transmission based precautions.

4.1.1. Airborne precautions (droplet nuclei <5μm)

- Individual room with adequate ventilation. (This includes, where possible, negative pressure; door closed; at least six air exchanges per hour; exhaust to outside away from intake ducts)
- Staff should wear high-efficiency masks before entering the room
- Patient should be confined to the room.

4.1.2. Droplet precautions (droplet nuclei >5μm)

- Individual room for the patient, if available
- Standard surgical splash proof masks (not a gauze mask) for health care workers.
- Patient's movements should be restricted; Patient should wear a standard surgical mask if leaving the room.

4.1.3.. Contact precautions/isolation

- Individual room for the patient if available. If not available, patients should be cohorted.
- Staff should wear gloves on entering the room.
- A gown should be worn during patient contact or contact with contaminated surfaces or material.
- Wash hands before and after contact with the patient and on leaving the room
- Restrict patient movement outside the room
- Appropriate environmental and equipment cleaning, disinfection and sterilization.

4.2. STRICT ISOLATION

The Microbiologist should be consulted before instituting strict isolation.

- Individual room with adequate ventilation. (This includes, where possible, negative pressure; door closed; at least six air exchanges per hour; exhaust to outside away from intake ducts)
- Restrict visitors and staff
- Mask, gloves, gowns, cap, eye protection for all entering the room
- Hygienic hand washing at entry to and exit from the room
- Use of disposable (single-use) equipment
- Disinfection of reusable medical equipment / linen
- Daily disinfection of the room and terminal disinfection after discharge.
- Appropriate transport and laboratory management of patient specimens.
- Incineration of excreta, body fluids, nasopharyngeal secretions

4.3. ASEPTIC PRECAUTIONS

The **entry site** must be properly cleaned

- Clean with 70 % alcohol over and around the selected site and allow to dry.
- Clean with 10% povidone iodine in a concentric fashion from the centre to periphery. Allow at least 2 minutes to act.
- If the patient is known to be allergic to iodine avoid the above step and repeat 70% alcohol until well cleaned.
- *Do not touch the site after disinfection*

The **hands** of the staff must be disinfected and gloved

- Wash hands using proper technique.
- Preferably use a sustained action disinfectant eg 4% chlorhexidine or 7.5% povidone iodine
- Use *sterile* gloves
- Use sterile drapes and gowns as necessary (eg CVP line)
- Use sterile devices and equipment.

CHAPTER 5

HAND HYGIENE

CHAPTER 5

HAND HYGIENE

Handwashing is considered to be the most effective measure in hospital infection control. Therefore it is important that health care workers (HCW) should maintain high standards of hand care.

5.1. INDICATIONS FOR HANDWASHING

Handwashing must take place prior to

- Contact with a patient
- Wearing gloves
- Administration of parenteral medicine
- Handling of invasive devices and catheters
- Moving from a contaminated body site to a clean body site of the same patient
- Meal break

Handwashing must take place after

- Removal of gloves
- Contact with blood, body fluids or other clinical material;
- Patient contact
- Contact with wounds
- Handling of invasive devices, catheters, drains and nebulizers
- Using the toilet

HANDS SHOULD BE WASHED IMMEDIATELY AFTER CONTAMINATION WITH
BLOOD AND BODY SUBSTANCES.

5.2. HANDWASHING TECNIQUE

- Nails must be clean and short.
- All jewellery should be removed prior to handwashing,
- Wet hands under running water
- Apply soap covering all surfaces of the hands.
- Vigorously rub all surfaces of lathered hands for 10-15 seconds. (Refer figure 1)
- Rub hands systematically covering all surfaces especially the tips of the fingers, the thumbs and the finger webs. (Refer figure 2)
- Rinse hands under running water.
- Hands should be dried thoroughly with a clean or sterile single use towel after washing. An automatic dryer is an alternative method for drying of hands.
- Leave adequate single use hand towels beside the sinks
- Keep a foot-operated bin to discard towels which are then collected and sent to the laundry for washing and reuse.

5.3. HANDWASHING AGENTS

- Soap - Liquid soap is better than bar soap. If only bar soap is available, provide small pieces which should be just adequate for the day, placed on a rack so that no water is retained (as in a dish).
- 2% - 4% chlorhexidine gluconate (has a good residual activity).
- 7.5% povidone iodine.

5.4. ALCOHOL HAND RUBS

- Used as an alternative to handwashing with soap and water or disinfectants.
- *Do not use for visibly soiled hands.*
- Has a good immediate activity. Residual activity is poor.
- *Does not require drying* with a towel, and does not require a designated area for hand washing.
- Less time consuming and does not cause drying of skin.
- Can be prepared in-house (97 ml of 70% alcohol + 3 ml of glycerol).

Figure 1. Handwashing technique

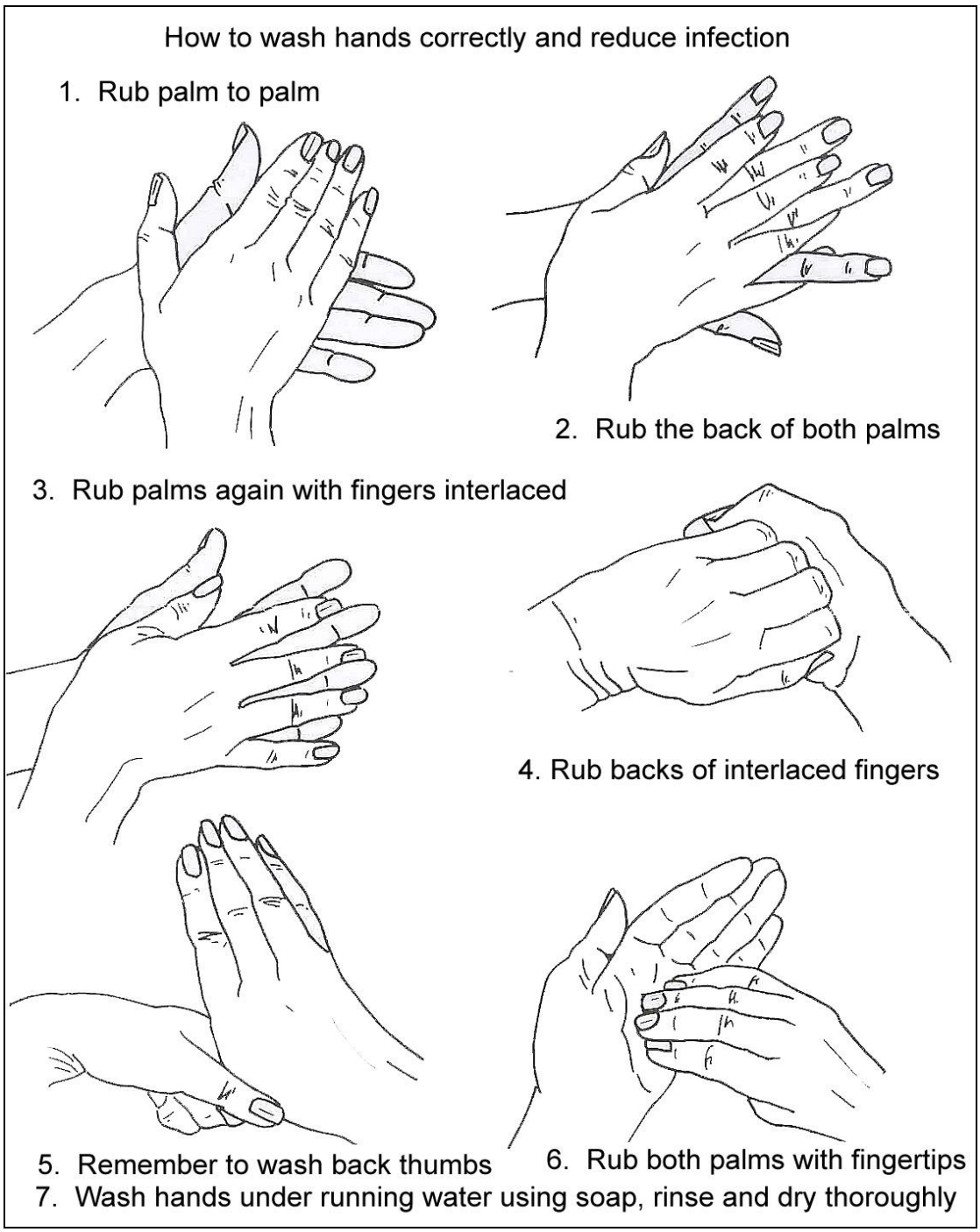
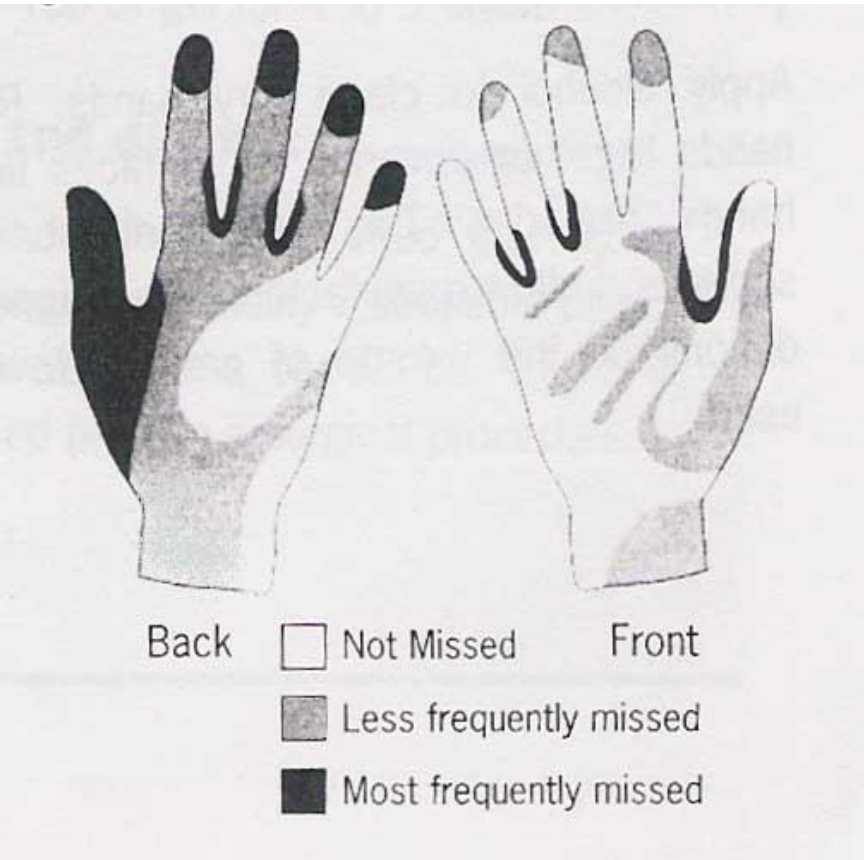


Figure 2. Areas of the hand most frequently missed



5.5. SURGICAL HAND SCRUB

- Remove all jewellery before scrubbing
- Nail brush should be used *only* for the first hand wash of the day to remove debris from underneath nails.
- Apply 3-5 ml of antiseptic detergent (eg. 4% chlorhexidine or 7.5% povidone iodine) to moistened hand and forearms
- Vigorously rub all surfaces of hands and forearms for approximately 3-5 minutes.
- The disinfection process must be thorough and systematic, covering all areas of the hands and forearms.
- Do not use brushes.
- Hands should be held high while washing with water
- Initial scrub should last for 3-5 minutes. In between cases, scrubbing should last for 2 to 3 minutes.

CHAPTER 6

CLEANING, DISINFECTION AND STERILIZATION

CHAPTER 6

CLEANING, DISINFECTION & STERILIZATION

6.1 DEFINITIONS

Sterilization

Sterilization is the complete elimination of all microbial forms including spores. This can be accomplished by moist heat, dry heat, ethylene oxide gas, liquid chemicals & irradiation.

Disinfection

Disinfection is the elimination of nearly all recognized pathogenic organisms, but not necessarily all microorganisms. Disinfection can be accomplished by the use of liquid chemicals (disinfectant, antiseptic), UV light, boiling water etc. This could be either high level disinfection or low level disinfection.

A disinfectant is a liquid chemical applied on to non-living surfaces (eg. trolley).
Antiseptic is a liquid chemical applied on to living tissues (eg. skin, mucosa).

Cleaning

Physical removal of dirt which removes many micro-organisms. Should also be done prior to sterilization & disinfection. Cleaning process is difficult to quantify other than visually.

6.2 CHOICE OF METHOD

This depends on the nature of the item to be treated, the likely microbial contamination and the risk of transmission of infection to patients or staff in contact with the item.

RISK GROUP	EXAMPLES	CHOICE OF PROCESSING
High risk (critical) Direct contact with a break in skin or mucus membrane or entering a sterile body area	Surgical instruments, needles, syringes, cystoscopes, laparoscopes, surgical dressings	Must be sterile Heat sterilization (autoclaving), chemical sterilants
Intermediate risk (semicritical) Direct contact with mucus membranes or non intact skin	Endotracheal tubes, gastroscopes & other endoscopes	High level disinfection acceptable, liquid chemicals
Low risk (non critical) Items in contact with intact skin	Stethoscopes, BP apparatus, bed pans, urinals	Low level disinfection or thorough cleaning with detergent acceptable

6.3 STOCK LIST OF ANTISEPTICS AND DISINFECTANTS

DISINFECTANT / ANTISEPTIC	STORAGE	DISPOSAL
ALCOHOLS		
60% isopropyl alcohol (surgical spirit) 70% ethyl alcohol	Room temperature, in a dark container with a close fitting lid. Label as inflammable.	Not applicable
Alcohol hand rub (isopropyl alcohol with glycerol)	Room temperature, in a dark container with a close fitting lid. Label as inflammable.	Not applicable
ALDEHYDES		
2% glutaraldehyde solution (Cidex)	<u>Prior to activation</u> Store in original sealed container at 15-30^0 C, out of direct sunlight <u>Activated solution</u> Store in original container till transferred, in a well ventilated low traffic area, at room temperature	<u>Deactivation</u> Neutralize by adding 8 ounce of sodium bisulphate to deactivate one gallon of 2% gluteraldehyde solution for 5 minutes. Discard into a drain. Flush thoroughly with water If sodium bisulphate is not available discard into a drain and flush thoroughly with water. However this is toxic to the environment
CHLORHEXIDINES		
0.5% chlorhexidine in 70% alcohol (Hibisol)	Room temperature, in a container with a close fitting lid	Not applicable
4% chlorhexidine gluconate (Hibitane)	Room temperature, in a container with a close fitting lid	Not applicable
4% chlorhexidine gluconate with a detergent (Hibiscrub)	Room temperature, in a container with a close fitting lid	Not applicable

CHLORINE RELEASING AGENTS		
Calcium hypochlorite (bleaching powder, TCL) (35% w/w of available chlorine)	Store in original container in a cool, dry & well-ventilated area (indoors). Keep container closed when not in use. Keep away from heat sources, sparks & open flames.	Dispose into cement or PVC pipes. Should not be disposed to metal pipes (corrosive damage).
Sodium hypochlorite liquid form 5% (stock solution) 1% (10,000 ppm) 0.1% (1000 ppm) 0.01% (125 ppm) Milton	Store in a closed opaque, plastic container at room temperature	Dispose into cement or PVC pipes. Should not be disposed to metal pipes (corrosive damage)
IODOPHORS		
Aqueous povidone iodine (10% solution, available iodine 1%) (Betadine, Wokadine)	Room temperature, in a dark container	Not applicable
7.5% Povidone iodine scrub (available iodine 0.75%) (Betadine scrub, Wokadine scrub)	Room temperature, in a dark container	Not applicable
PERACETIC ACID		
Peracetic acid (Perasafe)	Provided as a powder. Store in a cool (< 25^{o} C), dry place in the original container.	Dispose into drains. No special precautions to be taken.
PHENOLIC DISINFECTANTS		
Lysol (2%, 5% solutions)	Store in the original container at room temperature.	Dispose in to drains. No special precautions to be taken.

6.4. METHODS OF PREPARATION OF ANTISEPTICS AND DISINFECTANTS

DISINFECTANT	METHOD OF PREPARATION	PRECAUTIONS
Alcohol hand rub	97 ml of isopropyl/ ethyl alcohol with 3 ml of glycerol. Mix well. Commercial preparations also available (eg. Sterilium).	Volatile and inflammable
Calcium hypochlorite powder (35%w/w) Tropical chloride of lime (TCL)	Solutions should be made fresh & discarded immediately after use. Dissolve 30.0g of the powder in 1 L of water to get 1% (10,000 ppm) solution (used for high level disinfection, blood spills). Dilute this solution 10 times to make 0.1% (1000 ppm) solution (used for surface cleaning).	Avoid inhalation, contact with skin, eyes & clothing. Do not mix or allow contact with other chemicals (soaps, detergents, paints, solvents, combustible substances). Prepare in a well ventilated room to avoid inhalation. Wear gloves and masks. Bulk solution made daily. Store as indicated earlier. **Do not add water to the powder, add powder to water.** (Chlorine release is toxic at room temperature) Do not use on metal objects (corrosive) Can form carcinogenic products in the presence of formaldehyde.
4% chlorhexidine gluconate 2% chlorhexidine gluconate	Dilute stock solution of chlorhexidine with sterile water to required percentage. Concentrated stock solution is available in the indoor dispensary.	Ototoxicity possible if instilled to middle ear. High concentrations and preparations containing alcohol / surfactant may cause eye damage.

2% gluteraldehyde	Activate by adding the entire contents of the activator vial to the container. Shake well. Activated solution turns green immediately. Record the date of activation. Test activated solution with "Cidex solution test strips" prior to each time it is used. If test results are satisfactory re-use up to a **maximum of 14 days or 20 cycles whichever comes first.** Deactivation- refer table 6.3	Harmful by inhalation. Use only in well ventilated areas. Irritating to respiratory system, skin and eyes. Wear eye protection, face mask, gloves & fluid resistant apron. After disinfection, rinse the instrument 3 times in separate volumes of water for at least 1 min. (use sterile water for critical & semi-critical instruments).
10% povidone iodine	Ready to use preparation. **Do not dilute**	Can cause hypersensitivity & skin irritation. Avoid use on large body surface areas for prolonged periods (increases serum iodine levels). Contraindicated in hyperthyroidism and other disorders of thyroid function. Avoid in pregnant/nursing mothers, newborns. Avoid in patients allergic to iodine preparations.
2% Lysol 5% Lysol	Dilute stock solution of Lysol with water to required percentage.	Irritant, avoid contact with eyes and skin. Avoid use in infant bassinets & incubators (causes hyperbilirubinaemia). Avoid use on plastic & rubber (mackintosh, mattress covers) since it is absorbed and may increase permeability to body fluids. Avoid use on porous material as it leaves a film leading to irritation to skin and tissues.
Peracetic acid (Perasafe)	**Use lukewarm water (35^0 C).** 16.2g of "Perasafe" in 1 L of water. Stir till a clear blue solution is obtained. **Usable for 24 hrs after preparation.**	Irritant to skin, mucous membranes and eyes.

6.5 CLEANING AND DISINFECTION OF THE ENVIRONMENT

GPD - General Purpose Detergents
CSSD - Central Sterilization & Supplies Division
SU - Single Use

6.5.1. Floors and surfaces

Floors	GPD	Damp mop with GPD and water 3 times a day in clinical areas. Keep dry.
Mops & buckets	GPD	Wash in GPD and water and dry in sunlight and hang. Store mops and buckets clean, dry and inverted.
Horizontal surfaces	GPD	Table tops, lockers, bed railings, half walls, ledges should be damp wiped daily. Tops of curtain rails should be damp wiped weekly.
Walls	GPD 0.1% hypochlorite	Should be tiled or enamel painted up to 4-5 feet. Damp wiping is recommended 3 monthly. For certain infections (diarrhoeal pathogens, MRSA, GRE, Gp. A Streptococci) and frank soiling wipe with 0.1% hypochlorite.
Spills of body fluid & blood	1% hypochlorite (10,000 ppm)	Wear heavy duty gloves. Soak up fluid using absorbent material (paper towels, gauze, wadding). Pour 1% hypochlorite solution till it is well soaked. Leave for at least 10 minutes. Remove the absorbent material and discard as clinical waste. Clean area with detergent and water and dry. Discard gloves as clinical waste. Wash hands.

6.5.2. Furniture

Bed frames & cots	GPD 0.1% hypochlorite	Damp wipe with GPD on patient discharge or when soiled For patient with MRSA, GRE, Gp. A Streptococcus, etc, wipe with 0.1% hypochlorite.

Mattresses & Pillows	GPD 0.1% hypochlorite	Protect with waterproof covers. Covers should be intact. Wipe the covers with GPD between patients. When soiled disinfect with 0.1% hypochlorite. For patient with MRSA, GRE, Gp. A Streptococcus, etc, use 0.1% hypochlorite.
Other furniture	GPD 0.1% hypochlorite	Damp dust with GPD daily. Wipe surfaces with 0.1% hypochlorite after discharge of infected (MRSA, GRE, Gp. A streptococcus) patient
Lights and shades	GPD	Damp dust every 3 months
Telephone	70% alcohol	Wipe daily
Toys	GPD	If soiled, wash with GPD. Soft toys cannot be adequately decontaminated so if used by a child with infection should be sent home with the child or destroyed.

6.5.3. Bathroom items

Floors of bathrooms & toilets	GPD 2% Lysol	Clean with GPD 5 times a day. Disinfect with 2% Lysol in infectious diarrhoeas (cholera, shigella, salmonella).
Door handles, cistern handles	GPD 2% Lysol	Clean with GPD 5 times a day. Disinfect with 2% Lysol in infectious diarrhoeas (cholera, shigella, salmonella).
Commodes and toilet seats	GPD 2% Lysol	Clean with GPD 5 times a day. Disinfect surface with 2% Lysol in infectious diarrhoeas (cholera, shigella, salmonella). Pouring disinfectants into lavatory pans or drains not required. Wear gloves before the procedure and wash hands after.
Wash basins (sinks)	GPD	Clean with GPD 3 times a day. Pay attention to the tap.
Patient washing bowls	GPD	All patients should preferably have their own bowls. Wash and dry thoroughly daily

6.6 CLEANING, DISINFECTION AND STERILIZATION OF EQUIPMENT

6.6.1. Ventilators and accessories

Equipment	Disinfectant	Method
Ventilators	GPD 70% alcohol	Follow manufacturer's instructions wherever possible. Otherwise wipe clean with GPD or 70% alcohol and dry daily and between patients. External filters should be changed between patients. Clean internal mechanisms including internal filters, according to manufacturer's instructions, by authorized maintenance staff at the unit. All ventilators should have a user manual and maintenance records. Proper decontamination according to the manufacturer's instructions is needed after ventilation of patients with tuberculosis, resistant Gram-negative organisms in respiratory tract, MRSA in respiratory tract, definite fungal lung infections, lobar and community-acquired pneumonia.
Ventilator tubing	SU CSSD 2% gluteraldehyde peracetic acid	Tubes should be dated and changed weekly. For long term patients change the tubing twice a week Change tubes between patients. Single use tubes are the ideal. For reuse, clean with GPD and autoclave (if autoclavable) or use high level disinfection by immersing the tubing in 2% gluteraldehyde for 30 minutes or peracetic acid for 10 minutes and rinsing with sterile water. Store clean tubing dry and covered
Humidifiers	GPD CSSD 2% gluteraldehyde peracetic acid	During use, empty and clean reservoir daily with GPD. Dry thoroughly. Refill with sterile water. Use sterilized humidifiers for all patients. Autoclave. Alternatively use high level disinfection with 2% gluteraldehyde for 30 minutes or peracetic acid for 10 minutes and rinse with sterile water.
Reservoir bag	SU GPD	Reservoir bag is usually connected near the absorber and is usually protected from contamination by filters. Single use bags are preferred. For reuse, cleaning can be done by partially filling the bag with water and detergent and shaking the bag, and

	CSSD 2% glutaraldehyde	then rinsing with sterile water. Outer surface is washed with water and a detergent and dried. Disposable bags may be preferred on patients with known or suspected infections such as tuberculosis. If not disposable bags used on such patients should be autoclaved (if autoclavable).Alternatively, chemical disinfection using 2% glutaraldehyde for 30 minutes, followed by adequate rinsing with sterile water can be done.
Rebreathing circuit	SU	May be used throughout an operating list provided appropriate filters are in place
Airways -plastic -metal	 SU CSSD	
Oxygen masks	GPD 70% alcohol 1% hypochlorite	Change daily or when soiled. Change between patients. Use GPD to clean mask and wipe with 70% alcohol. If used on a patient with/suspected TB, immerse in 1% hypochlorite solution for 30 min and rinse with water.
Oxygen tubing	SU	
Laryngoscopes	CSSD GPD 70% alcohol	Ideally autoclave. Alternatively wash blade with GPD and wipe with 70% alcohol. Wipe hand piece with 70% alcohol. Store dry.
Endotracheal tubes	SU	Ideally single use. For reuse, clean with GPD. High level disinfection by immersing the tubing in 2% gluteraldehyde for 30 minutes or peracetic acid for 10 minutes and rinsing with sterile water. Store clean tubes dry and covered

6.6.2 Suction apparatus

Suction catheters	SU	
Suction tubing		Change daily and between patients. For reuse, clean with GPD and autoclave (if autoclavable) or use high level disinfection by immersing the tubing in 2% gluteraldehyde for 30 minutes or peracetic acid for 10 minutes and rinsing with sterile water.
Bottles/jars	CSSD 1 % hypochlorite. 2% gluteraldehyde.	Empty when 2/3 full or daily whichever is more frequent (if open drainage system, decontaminate first. Refer Chapter 11). If autoclavable send to CSSD after washing with GPD. The non-autoclavable ones should be washed with GPD and immersed in 1 % hypochlorite solution for 30 min. The metal lids should be immersed in 2% gluteraldehyde 30 minutes.

6.6.3 Nebulizers

Masks	GPD 70% alcohol 1% hypochlorite	Change daily or when soiled. Change between patients. Use GPD to clean mask and wipe with 70% alcohol. If used on a patient with/suspected TB, immerse in 1% hypochlorite solution for 30 min and rinse with water.
Tubing	SU 1% hypochlorite	If reused flush with GPD, aspirate 1% hypochlorite into the tubing using a syringe, immerse for 30 minutes and rinse well.
Peak flow meter	70% alcohol	Wipe mouth- piece with 70% alcohol after each patient use. Filter changed every three months.

6.6.4. Infusion lines

Infusion pumps	GPD	Wipe daily using GPD. Ensure surfaces completely free of feed and infusion residues.
Infusion stands	GPD	Wash when soiled and on completion of patient use.

6.6.5. Miscellaneous items

Trolleys and wheelchairs

Dressing trolley	GPD 70% alcohol	Clean thoroughly with GPD weekly. Before and after procedures wipe with 70% alcohol. Must be dry before placing sterile packs on surface.
Patient trolley	GPD, 0.1% hypochlorite	Keep clean. Wipe with 0.1% hypochlorite after use by patients with MRSA, GRE, Gp. A Streptococcus, etc.
Wheelchairs	GPD, 0.1% hypochlorite	Keep clean. For patient with MRSA, GRE, Gp. A Streptococcus, etc, wipe 0.1% hypochlorite after patient use.

Specula

Aural	GPD 70% alcohol	Detergent wash. If contaminated wash with GPD and either boil 100^{o} C for 30 minutes or use 70% alcohol to disinfect.
Vaginal	CSSD	Ideally should be autoclaved, if not, detergent wash and boil at 100^{o} C for 30 minutes
Proctoscopes	CSSD	Ideally should be autoclaved, if not, detergent wash and boil at 100^{o} C for 30 minutes

Personal protective equipment

Goggles/ Visors	SU GPD	Wash with GPD. Then wipe with 70% alcohol.

Other items

Thermometer	70% alcohol	Wipe and air dry.
Stethoscopes	70% alcohol	Wipe daily with 70 % alcohol at the beginning and end of the ward round / clinic session and after examining patients infected with multi resistant coliforms, MRSA, GRE. Dedicate one stethoscope per patient or clean with 70 % alcohol between patients in ICU and PBU.
Sputum pots	5% Lysol	A sputum mug containing 5% Phenol (Lysol) for sputum should be provided. This is ideally autoclaved before disposal. If facilities are not available for autoclaving they should be disposed by burning or deep burying after disinfection using 5% phenol or 1% hypochorite for 30 min. For stainless steel sputum cups after disinfection, washed with GPD.
Slings, patient hoist, orthopaedic supports	GPD	If made out of cloth dispose when contaminated with body fluids.
Surgical bowls	CSSD	
X-Ray equipment	GPD 70% Alcohol	Keep equipment clean by damp dusting. Wipe with 70% Alcohol after GPD if overtly contaminated.

6.7 CLEANING AND DISINFECTION OF LINEN

Clothing or bed linen used by hospital patients is a possible cross infection risk to patients and staff handling them.

- Bed linen should be changed on discharge of a patient or if it becomes soiled or contaminated. Every patient should have clean bed linen.
- Curtains should be washed on a scheduled basis or when soiled. Change following occupation of bed or room by a patient with MRSA, GRE, Gp. A streptococcus infection.

6.7.1. Categories of used linen

Dirty linen

All general linen used by patients (not contaminated with blood and body fluids).

Soiled linen

Used linen contaminated with body fluids eg. blood, urine faeces.

Infected linen

Linen from patients with specific infections with a potential to infect other patients or staff handling them. eg. linen from a patient with enteric fever, dysentery, hepatitis, HIV and MRSA.

6.7.2. Handling of linen

- Dirty linen should be washed with water (hot water where available) and detergent.
- Soiled and infected linen should be handled as little as possible with minimum amount of agitation to prevent exposure and contamination.
- All used linen should be bagged immediately after removal.
- Linen should not be carried along corridors unbagged.
- Bags should not be overfilled.

- Ideally soiled linen and infected should be washed in a washing machine with a hot cycle using bleach. Alternatively they should be soaked in 0.5-1% hypochlorite solution for 30 minutes in the wards/operation theatre before sending to the laundry.
- If washing of linen is done by hand, staff should wear heavy duty gloves and plastic aprons.
- If sterilization is needed the washed linen should be send to the CSSD for autoclaving.

6.7.3. Handling of clean linen

- Must be transported in such a way as to ensure a clean status.
  Must be stored in a clean dry area above floor level

CHAPTER 7

CLINICAL GUIDELINES

CHAPTER 7

CLINICAL GUIDELINES

7.1 SKIN PREPARATION FOR INVASIVE PROCEDURES

7.1.1. Routine surgical sites

- Limit the preoperative stay of the patient to minimize colonization with hospital flora.
- For elective surgical patients it is recommended to have a bath on the previous day.
- Avoid shaving if possible. If shaving is necessary shave immediately prior to the surgery. Depilatory creams can be used or hair can be clipped short.
- Use 10% povidone iodine to disinfect skin. For mucus membranes use 5% aqueous povidone iodine.
- If the patient is known to be allergic to iodine use 2% - 4% chlorhexidine.
- Apply antiseptic gauze swab over and well beyond the operative site in circular movements starting from the centre and going outwards. At least 2 minutes should be allowed for contact time. Repeat the same procedure.
- If alcoholic solutions are used, skin should be allowed to dry-especially if diathermy is to be used.

7.1.2 Skin preparation for blood culture

- Aseptic precautions should be taken (Refer 4.2).
- Wash hands with soap and water prior to starting the procedure.
- Clean with alcohol over and around the selected site and allow to dry.
- Clean with 10% povidone iodine in a concentric fashion from the centre to outward. ***Allow at least 2 minutes to act.***
- If the patient is known to be allergic to iodine use 4% chlorhexidine.
- Handwash and wear a pair of sterile gloves.
- Using a sterile needle and a syringe draw blood for culture.
- After venepuncture, residual iodine should be removed with surgical spirit and a small dressing should be applied over the puncture site.

7.1.3 Skin preparation for other invasive procedures

Eg. lumbar puncture, lung aspirate, percutaneous needle biopsies

Same as for blood culture

7.1.4 Skin preparation for minor procedures

E.g. IM injections

Clean the skin with 70% ethyl alcohol and allow to dry.

7.2 GUIDELINES FOR THE PREVENTION OF INTRAVASCULAR (IV) CATHETER RELATED INFECTIONS

7.2.1 Peripheral venous cannulae

- In adults, upper extremity insertion sites are preferable than lower extremity.
- Avoid grossly contaminated areas or skin creases.
- Hands should be washed with soap and water before and after insertion and between procedures.
- Use a new pair of disposable clean gloves.
- Selected insertion site must be disinfected with 70% alcohol and allowed to dry.
- After insertion, cannula must be secured, to stabilize it at the insertion site and covered with a sterile dressing.
- The date of insertion must be recorded on the BHT and if possible on the dressing.
- Cannula site *must be inspected daily* for evidence of infection and resited at first site of inflammation.
- Gauze dressing should be changed in 48 – 72 hours or when damp, loosened or visibly soiled.
- Flushing or irrigation of the system is preferably avoided.
- *The IV system must be maintained as a closed system*. All entries should be at the injection ports. Wipe port with 70% alcohol before and after use. All entry ports should be kept closed when not in use.
- IV administration sets should be changed every 48 – 72 hours.
- IV administration sets used for parenteral nutrition and administration of blood, blood products or lipids must be changed within 24 hours.
- Peripheral cannulae are usually kept for *no longer than 72 hours*. If used for longer periods, they should be replaced every 48 – 72 hours in adults. However in children the cannula can be left in situ until IV therapy is completed or a complication occurs.
- IV cannulae should be removed as soon as possible and a sterile dressing should be applied.

7.2.2. Arterial catheters / Central venous catheters (CVC)

- Insertions should be done in designated clean areas. eg. Intensive care units, Operating theatres.
- For CVC, subclavian site is preferred to jugular or femoral sites.
- Handwashing with an antiseptic (2%-4% chlorhexidine) is essential prior to insertion and before any manipulation.
- The operator should wear sterile gloves, mask and gown. All members of staff associated directly with insertion of CVC should prepare themselves as for theatre.
- Avoid shaving insertion site if possible.
- The insertion site is cleaned with 2%-4% chlorhexidine. Alternatively 70% alcohol followed by 10% povidone iodine can be used.
- Clean the skin beginning at the centre of the insertion site using a circular motion and move outwards. Leave for about 2 minutes to dry.
- After insertion catheter should be firmly anchored to the skin.
- Sterile dressing should be applied to cover the insertion site.
- Date of insertion, name of the inserter must be recorded on the BHT.
- Inspect catheter site visually for evidence of infection daily.
- Gauze dressings should be changed in 48-72 hours and polyurethane dressings in 4-7 days or when damp, loosened or visibly soiled taking aseptic precautions.
- Routine resiting/replacement of CVC is not necessary unless there is evidence of infection. *In the presence of infection replacement of CVC over the guide wire should not be done.*
- *Remove the catheter when no longer required*. It could be kept for a maximum period of 3 months.
- Before removal clean the surrounding skin with 2%-4% chlorhexidine or 10% povidone iodine and allow to dry.
- If culture is required avoid accidental contamination of the tip. Cut off 5 cm of the distal catheter end using sterile scissors and place in a sterile container and send to the microbiology laboratory for culture. Also send a blood culture from a peripheral vein.
- Apply a sterile dressing after removing the catheter.

7.3 URINARY CATHETERIZATION

7.3.1 General principles

- The use of urinary catheters should be limited to clinical needs that cannot be met by other means. Whenever possible other methods of urinary drainage such as condom catheter drainage, intermittent urethral catheterization and adult disposable diaper pads can be used instead of indwelling urethral catheterization.
- Only persons who have had adequate training regarding the correct technique of aseptic insertion and maintenance of catheter should be involved in catheter care.
- Hands should be washed immediately before and after insertion and any manipulation of the catheter or drainage system.
- All procedures involving the catheter drainage system should be documented in the medical or nursing notes. This should include the name of the person inserting the catheter, the date, type and size of catheter and the volume of water in the balloon.

7.3.2 Catheter insertion

- Catheters should be inserted using aseptic technique.
- The external meatus should be cleaned with saline. In females, clean vulval area and urethral meatus.
- Wash hands with soap and water and wear sterile gloves before inserting the catheter. A second pair of gloves should be available, should contamination occur.
- Urethra should be lubricated with sterile, single use, anaesthetic gel.
- Insert catheter gently. NEVER USE FORCE.
- If unsuccessful in the first attempt the catheter should be discarded and a new catheter should be used.
- Catheter should be anchored to the thigh securely with plaster.
- Date of insertion must be recorded on the bed head ticket (BHT).

7.3.3 Catheter care and maintenance

- Once drainage is established maintain a closed system.
- *The urine bag must be kept below the level of the bladder at all times,* including when emptying the bag, to maintain an unobstructed flow of urine. Do not let the urine bag touch the floor.
- When emptying the urine bag it is recommended to wear a pair of clean disposable gloves for each patient.
- The urine bag should be emptied without its outlet touching the receptacle.
- Meatal cleaning with antiseptic is not recommended. Keep perineal area clean. Daily meatal catheter care with sterile saline is a reasonable hygienic measure.
- Urine bags should be changed once a month. In high risk units, urine bag should be changed every two weeks.

7.3.4 Transportation of a patient with a catheter

- Make sure that straps of the urine bag are untied before shifting the patient to avoid inadvertent pulling of the catheter with resultant trauma.
- During transit maintain the closed drainage system.
- The urine bag must be kept below the level of the bladder during transportation.

7.3.5. Catheter urine specimens for culture

- Urine should be collected using a sterile syringe and a needle.
- Clamp the catheter about 1" above the bifurcation. After about 5-10 minutes clean the tubing above the clamp with 70% alcohol.
- To aspirate urine insert needle in a 'head to toe' direction at an angle to prevent leakage. Aspirate 5-10 ml of urine.
- Release the clamp and withdraw the needle.
- *The closed system should not be broken to collect samples and samples should not be collected from the bag.*

7.3.6. Catheter removal

- Remove the catheter as soon as possible.
- Foley catheters (Latex) should be changed every 28 days. Silicone catheters may be kept for 90 days.

7.4. GUIDELINES FOR THE PREVENTION OF INFECTION ASSOCIATED WITH TRACHEAL SUCTION

7.4.1. General principles

- Hands should be washed prior to suction and after contact with mucous membranes, respiratory secretions, endotracheal or tracheostomy tubes or any respiratory device used on a patient, *whether or not gloves have been worn*.
- Secretions should not be allowed to accumulate in the lower respiratory tract. In ventilated patients, secretions including that collected above the tracheal cuff should be removed regularly. Secretions should be removed before patient is moved or before tracheal cuff is deflated for any reason.
- Post-operative pneumonia may be prevented by taking precautions such as adequate suction during prolonged anaesthesia, avoiding aspiration during intubation and extubation and adequate humidification of anaesthetic gases. Pre-operative and post-operative deep breathing exercises and early mobilization should be encouraged. Patients who are not mobile should be repositioned every 2 hours.
- Analgesia used should have minimal cough suppressant effect.

7.4.2. Suction of respiratory secretions

- Suction should be carried out only when clinically indicated.
- Suction equipment should be kept on a trolley or a tray which should be cleaned and replenished regularly.
- A gown and a standard splash proof surgical mask (not a gauze mask) and, if possible, eye protection should be worn.
- Hands should be washed thoroughly, rinsed with running water and wiped with single use towel. Alternatively alcohol hand rub can be used on clean hands.
- Clean gloves must be worn.
- A sterile disposable suction catheter must be used for each session.
- Open the sterile package at the end that is to be attached to the suction apparatus and attach the suction tube holding the catheter through the

packaging. The rest of the catheter is kept inside the pack until it is removed with the gloved hand immediately prior to suction. Never leave a fresh catheter out of the pack.

- The catheter should be introduced gently and without suction
- Suction pressure should never exceed 200 mm mercury and 10 – 15 seconds should be sufficient for effective aspiration.
- Secretions should be removed without compromising the cardio-respiratory function and with minimal trauma to the respiratory tract.
- The catheter should be withdrawn with a gently rotating motion while using intermittent suction. If the procedure needs to be repeated, the gloves and the catheter should be changed.
- Gloves sand gown should be removed and hands thoroughly washed immediately after suction.

7.4.3. Management of suction bottles and tubing

Refer 6.6.2.

7.5 WOUND CARE

- Wound dressings should be done in a designated area.
- Individual sterile surgical packs should be used for each patient, whenever possible
- Should clean and disinfect mackintosh after each patient. If this is not possible wound dressing should be done on patient's own bed.

7.5.1 General procedures

- Wash hands before handling wounds
- Sutures should be removed at the beginning of the list.
- Septic wounds and contaminated wounds should be dressed at the end of the dressing list.
- Dressings should be discarded as clinical waste.
- To reduce opportunities for airborne contamination to a minimum, the wound should be exposed for the minimum time and dressings should be removed carefully and quickly.
- Aseptic technique when necessary (including use of sterile gloves and forceps (no-touch technique)

Choice of gloves for wound care

Sterile gloves for	**Clean gloves for**
Acute surgical wounds	Chronic wounds
Intravenous line sites	Leg ulcers
Central venous/TPN line sites	Pressure sores
Surgical drain sites (E.g. Redivac)	Stoma sites
Orthopedic pin sites	Fungating wounds
Burns	

7.5.2 Surgical wounds

- Wounds should be handled with aseptic techniques.
- Post-operative wound dressings should be fully adherent.
- Dressings must not be disturbed until the suture are removed (for at least 3 – 5 days after surgery) unless there is a clinical indication such as
  - to remove drains/sutures
  - discharge/ blood
  - odour
  - pain
  - inflammation and swelling
  - unexplained fever

7.5.3 Discharging wounds

- All discharging wounds should be adequately covered.
- Dressings must be changed when visibly soiled.
- Surgical wounds with a discharge require daily dressings.
- Exudates from wounds may contaminate hands or other surfaces which come into contact with it. Therefore proper hand hygiene and environmental cleaning is important.
- Patients with wounds colonized or infected with multi-drug resistant organisms should be barrier nursed. Strict hand hygiene should be practiced by all staff.

7.5.4 Chronic wounds

- Colonisation of open lesions and chronic wounds by bacteria will not necessarily affect wound healing.
- In many cases debridement may be enough.
- Patients with wounds colonized or infected with multi-drug resistant organisms should be barrier nursed. Strict hand hygiene should be practiced by all staff.

7.6 MANAGEMENT OF SURGICAL DRAINS

- Closed drainage systems should be used whenever possible.
- Drains should be removed as soon as possible.
- Use aseptic techniques when handling drains.
- Wet dressings must be changed.
- In open drains the skin area around the drain must be kept dry to avoid infection.
- After removal of the drain the wound should be covered with a dressing until the wound is healed and dry.

7.6.1 Closed drainage

- Intercostal bottle should contain either sterile water or sterile saline. This should be changed daily or more frequently when there is excessive drainage.
- The drainage bottle must be kept at a lower level than the site of drainage at all times to prevent back flow.
- To re-use the bottles, empty the contents into sluice.
- Untreated effluent should be discharged through a sanitary sewerage system to a treatment plant or closed drainage system if this facility is available. There should be a dedicated sink/commode for this purpose. Health care worker should wear personal protective equipment and should avoid splashing and aerosol formation.
- If there is no closed drainage system, decontaminate with 1% hypochlorite solution or if tuberculosis is suspected 2% Lysol solution overnight, before discharging in to the drainage system.
- Wash bottles with GPD and sent to CSSD for autoclaving.
- The non-autoclavable ones should be washed with GPD and immersed in 1 % hypochlorite solution for 30 min. The metal lids should be immersed in 2% gluteraldehyde and rinse with sterile water and dry.

7.6.2 Transportation of patients with drains

- Maintain a closed sterile drainage system during transportation.
- Do not clamp or disrupt the drainage system.
- Do not raise the drainage bag or bottle above the level of the body cavity from which drainage is connected.

CHAPTER 8

INFECTION CONTROL

IN

SPECIALIZED UNITS

CHAPTER 8

INFECTION CONTROL IN SPECIALIZED UNITS

8.1 INFECTION CONTROL IN THE INTENSIVE CARE UNIT (ICU*)*

8.1.1. Design and layout of the Intensive Care Unit

General Requirements

- Quick and unimpaired access of staff to patients.
- Source isolation, protective isolation or both
- Facilities for handwashing and drying available at each bed

Isolation

- An 8 bed unit, with 2 divisions (each having 3 beds) and 2 isolation rooms (single bed) are recommended.

Space

- There should be adequate space between beds. eg. 3m between bed centres.

Ventilation

- It is desirable to have mechanical ventilation with a turnover of air (e.g. 10 air changes per hour) to keep airborne bacteria at a low level

8.1.2. Handwashing and aseptic precautions

Please refer guidelines on hand hygiene (Chapter 5) and on aseptic procedures (Chapter 4)

8.1.3. Environmental cleaning

GPD - General Purpose Detergents
CSSD - Central Sterilization & Supplies Division
SU - Single Use

Floors	- Mop with GPD twice a day. - Use 0.1% hypochlorite if there is an outbreak of sepsis
Mops	- Use separate mops for different cubicles. - Dry the mops in sun light. - Store them upside down. - Wash mops in 0.1% hypochlorite weekly.
Walls	- Damp dust with GPD once weekly.
Horizontal Surfaces	- Damp dust with GPD daily and between patients. Dry with clean dry cloth.
Sinks, taps and door handles	- Wash twice a day with GPD
Bath rooms	- Wash twice daily with GPD, including, door knobs and taps.
Telephone	- Wipe daily with 70 % alcohol.
Cleaning of Spillages	- Refer 3.5.1.

8.1.4. Cleaning, Disinfection and Sterilization of furniture and equipment

GPD - General Purpose Detergent
CSSD - Central Sterilization & Supplies Division
SU - Single Use

Furniture

Beds and bedrails bedside cupboards	- Damp dust daily with GPD - Clean with GPD and 0.1% hypochlorite for septic patients.
Mattresses	- Cover with impermeable material - Damp dust weekly with GPD - Wipe with GPD between patients and dry thoroughly. - Replace torn mattresses. - Clean with GPD and 0.1% hypochlorite for septic patients.
Other Furniture	- Minimize the number - Damp dust weekly with GPD. - Use a separate storage area for non-essential items.

Ventilators and accessories

Equipment	Disinfectant	Method
Ventilators	GPD 70% alcohol	Follow manufacturer's instructions wherever possible. Otherwise wipe clean with GPD or 70% alcohol and dry daily and between patients. External filters should be changed between patients. Clean internal mechanisms including internal filters, according to manufacturer's instructions, by authorized maintenance staff at the unit. All ventilators should have a user manual and maintenance records. Proper decontamination according to the manufacturer's instructions is needed after ventilation of patients with tuberculosis, resistant Gram-negative organisms in respiratory tract, MRSA in respiratory tract, definite fungal lung infections, lobar and community-acquired pneumonia.

Ventilator tubing	SU CSSD 2% gluteraldehyde peracetic acid	Tubes should be dated and changed weekly. For long term patients change the tubing twice a week Change tubes between patients. Single use tubes are the ideal. For reuse, clean with GPD and autoclave (if autoclavable) or use high level disinfection by immersing the tubing in 2% gluteraldehyde for 30 minutes or peracetic acid for 10 minutes and rinsing with sterile water. Store clean tubing dry and covered
Humidifiers	GPD CSSD 2% gluteraldehyde peracetic acid	During use, empty and clean reservoir daily with GPD. Dry thoroughly. Refill with sterile water. Use sterilized humidifiers for all patients. Autoclave. Alternatively use high level disinfection with 2% gluteraldehyde for 30 minutes or peracetic acid for 10 minutes and rinse with sterile water.
Reservoir bag	SU GPD CSSD 2% glutaraldehyde	Reservoir bag is usually connected near the absorber and is usually protected from contamination by filters. Single use bags are preferred. For reuse, cleaning can be done by partially filling the bag with water and GPD and shaking the bag, and then rinsing with sterile water. Outer surface is washed with water and a GPD and dried. Disposable bags may be preferred on patients with known or suspected infections such as tuberculosis. If not disposable bags used on such patients should be autoclaved (if autoclavable).Alternatively, chemical disinfection using 2% glutaraldehyde for 30 minutes, followed by adequate rinsing with sterile water can be done.
Rebreathing circuit	SU	May be used throughout an operating list provided appropriate filters are in place
Airways -plastic -metal	 SU CSSD	
Oxygen masks	GPD 70% alcohol 1% hypochlorite	Change daily or when soiled. Change between patients. Use GPD to clean mask and wipe with 70% alcohol. If used on a patient with/suspected TB, immerse in 1% hypochlorite solution for 30 min and rinse with water.

Oxygen tubing	SU	
Laryngoscopes	CSSD 70% ethyl alcohol	Ideally autoclave. Alternatively wash blade with GPD & wipe with 70% alcohol. . Wipe hand piece with 70% alcohol. Store dry.
Endotracheal tubes	SU	Ideally single use. For reuse, clean with GPD. High level disinfection by immersing the tubing in 2% gluteraldehyde for 30 minutes or peracetic acid for 10 minutes and rinsing with sterile water. Store clean tubes dry and covered

Suction apparatus

Suction catheters	SU	
Suction tubing		Change daily and between patients. For reuse, clean with GPD and autoclave (if autoclavable) or use high level disinfection by immersing the tubing in 2% gluteraldehyde for 30 minutes or peracetic acid for 10 minutes and rinsing with sterile water.
Bottles/jars	CSSD 1 % hypochlorite. 2% glutereldehyde.	Empty when 2/3 full or daily whichever is more frequent (if open drainage system, decontaminate first. Refer Chapter 11). If autoclavable send to CSSD after washing with GPD. The non-autoclavable ones should be washed with GPD and immersed in 1 % hypochlorite solution for 30 min. The metal lids should be immersed in 2% gluteraldehyde 30 minutes.

Nebulizers

Masks	GPD 70% alcohol 1% hypochlorite	Change daily or when soiled. Change between patients. Use GPD to clean mask and wipe with 70% alcohol. If used on a patient with/suspected TB, immerse in 1% hypochlorite solution for 30 min and rinse with water.

Tubing	SU 1% hypochlorite	If reused flush with GPD, aspirate 1% hypochlorite into the tubing using a syringe, immerse for 30 minutes and rinse well.
Peak flow meter	70% alcohol	Wipe mouth- piece with 70% alcohol after each patient use. Filter changed every three months.

Infusion lines

Infusion pumps	GPD	Wipe daily using GPD. Ensure surfaces completely free of feed and infusion residues.
Infusion stands	GPD	Wash when soiled and on completion of patient use.

Other monitoring equipment

Arterial lines	- Single-use, pre-sterilized items - Change all equipment every 48 hours.
BP cuffs	- One per patient. - Wash with GPD purpose GPD and dry between patients
ECG monitors	- External – damp dust daily and between patients. - Wipe control panels with GPD /alcohol wipe at the beginning of a shift.
Stethoscopes	- One per patient. - Clean daily and between patients with alcohol wipes. - Should not be taken from patient to patient without cleaning.

8.1.5. Unit discipline

Aim is to achieve protective isolation of patients	- Staff handling patients must wash hands thoroughly before and after attending on patients - Staff coming in from other areas of hospital should wear gowns only if they examine or make contact with the patient. - Staff and visitors with obvious infections should not enter. - Visitors and staff should not touch anything unless it is absolutely essential to do so.

8.1.6. Waste disposal

Follow general guidelines on waste disposal. Refer Chapter11

8.1.7. Linen

Follow general guidelines on linen. Refer 6.7

8.1.8. Occupational health

Exposure management and immunization, Refer Chapter 12

8.2 INFECTION CONTROL IN SPECIALIZED BABY CARE UNITS

8.2.1. Design and layout

Provide separate

- duty room
- storage space
- rest room for the nurses
- feed preparation area
- isolation facility
- mothers room

8.2.2. Handwashing and aseptic precautions

Please refer guidelines on hand hygiene (Chapter 5) and on aseptic procedures (Chapter 4)

8.2.3. Environmental cleaning

GPD - General Purpose Detergents
CSSD - Central Sterilization & Supplies Division
SU - Single Use

Floors	- Mop with GPD twice a day. - Use 0.1% hypochlorite if there is an outbreak of sepsis
Mops	- Use separate mops for different cubicles. - Dry the mops in sun light. - Store them upside down. - Wash mops in 0.1% hypochlorite weekly.
Walls	- Damp dust with GPD once weekly.
Horizontal Surfaces	- Damp dust with GPD daily and between patients. Dry with clean dry cloth.
Sinks, taps and door handles	- Wash twice a day with GPD

Bath rooms	- Wash twice daily with GPD, including, door knobs and taps.
Telephone	- Wipe daily with 70% alcohol.
Cleaning of Spillages	- Refer 3.5.1.

8.2.4. Cleaning, disinfection and sterilization of furniture and equipment

GPD - General Purpose Detergents
CSSD - Central Sterilization & Supplies Division
SU - Single Use

Furniture

Cots and cot rails bedside cupboards	- Damp dust daily with GPD - Clean with GPD and 2% chlorhexidine, if baby is septic
Mattresses	- Cover with impermeable material - Damp dust weekly with GPD - Wipe with GPD between patients and dry thoroughly. - Replace torn mattresses. - Clean with GPD and 2% chlorhexidine, if baby is septic
Bed nets	- Keep two sets of bed nets per cot. - Wash with GPD after discharging the baby - Wash weekly with GPD
Other Furniture	- Minimize the number - Damp dust weekly with GPD. - Use a separate storage area for non-essential items.

Baby incubators

Clean after each patient or once weekly using manufacturer's instructions where available. If unavailable, clean as detailed below.	
Port hole	- Wipe with damp cloth moistened with GPD - Clean with 2% chlorhexidine, if baby is septic. - *Do not use alcohol, hypochlorite, gluteraldehyde.*
Other Plastic parts, hood and inner walls	- Wipe with damp cloth moistened with GPD - If baby is septic use 2% chlorhexidine.
Lower unit (mattress, mattress tray)	- Clean with GPD and dry - Clean with 2% chlorhexidine, if baby is septic
Patient probe	- Rinse with GPD and dry; - Clean with 2% chlorhexidine, if baby is septic. - *Do not use alcohol*
Control panel	- Wipe with damp cloth moistened with GPD
Oxygen Inlet	- Clean with GPD and dry
Humidifier	- *Avoid topping up* - Disassemble; rinse with GPD and dry. - Clean with 2% chlorhexidine, if baby is septic. - Refill with sterile water (distilled water is not necessary) daily and in between patients.

Suction apparatus

Suction catheters	SU	
Suction tubing		Change daily and between patients. For reuse, clean with GPD and autoclave (if autoclavable) or use high level disinfection by immersing the tubing in 2% gluteraldehyde for 30 minutes or peracetic acid for 10 minutes and rinsing with sterile water.
Bottles/jars	CSSD 1 % hypochlorite. 2% gluteraldehyde.	Empty when 2/3 full or daily whichever is more frequent (if open drainage system, decontaminate first. Refer Chapter 11). If autoclavable send to CSSD after washing with GPD. The non-autoclavable ones should be washed with GPD and immersed in 1 % hypochlorite solution for 30 min. The metal lids should be immersed in 2% gluteraldehyde 30 minutes.

Miscellaneous items

Trolleys (injection, procedure, and dressing trolleys)	- Wash with GPD once a week - Before and after a procedure wipe with 70% alcohol.
Baby weighing scales	- Between babies clean with GPD - Place the baby on its own sheet
Stethoscope	- Wipe with 70% alcohol between babies

8.2.5. Milk Preparation

- *Promote exclusive breast feeding* - Advise mother to wash hands before and after handling baby.	
Feeding bottles, teats and breast milk cups	- Wash with soap and water. - Immerse in Milton solution (125 ppm available chlorine) for 30 minutes or boiling water for 20 minutes - Use an oven to dry, if available.
NG tubes for gavage feeding	- No hard data for recommendation
Syringes used for feeding	- Discard after each feed.

8.2.6. Unit discipline

Do not lean on or touch equipment / furniture unnecessarily

8.2.7. Waste disposal

Follow general guidelines on waste disposal. Refer Chapter11

8.2.8. Linen

Follow general guidelines on linen. Refer 6.7

8.2.9. Occupational health

Exposure management and immunization, Refer Chapter 12

8.3 INFECTION CONTROL IN THE LABOUR ROOM

8.3.1. Handwashing and aseptic precautions

Please refer guidelines on hand hygiene (Chapter 5) and on aseptic procedures (Chapter 4)

8.3.2. Environmental cleaning

GPD - General Purpose Detergents
CSSD - Central Sterilization & Supplies Division
SU - Single Use

Floors	- Use dedicated mops for the labour room. - Mop three times daily with 0.1% hypochlorite - Dry the mops in sunlight and store them dry, upside down. - Wash mops in 0.1% hypochlorite weekly.
Walls	- Damp dust with GPD daily.
Horizontal Surfaces	- Damp dust with GPD daily and between patients. Dry with clean dry cloth.
Sinks, taps and door handles	- Wash five times a day with GPD.
Bathrooms	- Clean with 0.1% hypochlorite five times a day.
Fans	- Damp dust once in three months.
Telephone	- Wipe daily with 70 % alcohol.
Cleaning of Spillages	- Refer 3.5.1.

8.3.3. Cleaning, disinfection and sterilization of furniture and equipment

GPD - General Purpose Detergents
CSSD - Central Sterilization & Supplies Division
SU - Single Use

Furniture

Furniture including storage cupboards	- Minimize number. - Damp dust daily with GPD. - Use a separate storage area for non essential items
Beds and Cots	- Damp dust daily with GPD
Mackintosh	- Immerse in 0.1% hypochlorite then wash with soap and water - Hang to dry
Mattresses	- *Should have an impermeable covering* - Wash with GPD after discharge and dry thoroughly. - Clean weekly. Replace torn mattresses and keep them dry

Suction apparatus

Suction catheters	SU	
Suction tubing		Change daily and between patients. For reuse, clean with GPD and autoclave (if autoclavable) or use high level disinfection by immersing the tubing in 2% gluteraldehyde for 30 minutes or peracetic acid for 10 minutes and rinsing with sterile water.
Bottles/jars	CSSD 1 % hypochlorite. 2% gluteraldehyde.	Empty when 2/3 full or daily whichever is more frequent (if open drainage system, decontaminate first. Refer Chapter 11). If autoclavable send to CSSD after washing with GPD. The non-autoclavable ones should be washed with GPD and immersed in 1 % hypochlorite solution for 30 min. The metal lids should be immersed in 2% gluteraldehyde 30 minutes.

Miscellaneous items

Delivery set	- Use a separate delivery set for each patient. - After use, wash instruments with GPD, pack and send to CSSD.
Vaginal speculum	- Ideally, should be autoclaved. - If not, wash with GPD boil at 100^{o} C for 30 minutes
Trolleys	- Wash with GPD at the end of the day - Before and after a procedure wipe with 70% alcohol.
Baby scales	- Between babies clean with GPD. - Use an autoclaved cloth to place the baby and change between babies. Alternatively, place the baby on its own sheet.
Stethoscope	- Wipe with 70% alcohol.
Thermometer	- Disinfect with 70% alcohol wipe and store dry.
Oxygen mask	- Wash with GPD and wipe with 70 % alcohol
Laryngoscopes	- Ideally autoclave. - Alternatively wash blade with GPD and wipe with 70% alcohol. - Wipe hand piece with 70% alcohol. Store dry.
Razors	- Single use disposable razors are recommended - If not possible use a disposable blade for each patient and rinse razor head with hot water and soap after use.

8.3.4. Cleaning of Spillages

Blood spillages and other body fluids, Refer 3.5.1

8.3.5. Unit discipline

Vaginal examination (VE)	- Use sterile gloves and sterile cotton swabs moistened with normal saline for VE. - Do minimum number of VE.
Episiotomy and repair	- Use a separate sterile pack for each patient. - Clean the area with 70% alcohol. - Inject local anaesthetic. - Use sterile scissors, forceps and suture material for suturing.
Urethral catheterization	- Refer clinical guidelines chapter 7

8.3.6. Linen

Follow general guidelines on linen. Refer 6.7

8.3.7. Waste Disposal

Follow general guidelines on waste disposal. Refer Chapter11	
Disposal of placentae / abortus	- Placentae/ abortus should be discarded into a separate waste bag - Collect twice daily and sent for burial /incineration / cremation.

8.3.8. Occupational health

Exposure management and immunization, Refer Chapter 12

8.4 INFECTION CONTROL IN ENDOSCOPY UNITS

8.4.1 Sterilization and disinfection of flexible endoscopes

- As soon as the endoscope is removed from the patient, wipe off excess mucus etc from the insertion tube using sterile gauze, wearing gloves.
- Endoscope should not be placed on any other work surface.
- Place distal end of insertion tube in a bowl containing GPD and water and aspirate through suction channel for at least 30 seconds.
- Flush air/water channel.
- Perform a leak test.
- Disconnect endoscope from light source and immerse whole instrument in a tray GPD solution.
- Remove the air/water cleaning adaptor, suction valve, biopsy valve, distal hood and CO_2 valve of colonoscope and place them in the tray of GPD solution.
- Wash outside of the instrument with gauze swabs, and clean the distal tip thoroughly with a soft toothbrush.
- Pass the cleaning brush through the suction valve hole into the instrument channel up to the tip of the endoscope. Clean the bristles carefully before withdrawing the brush. Repeat until the channel is clean.
- Insert cleaning brush through biopsy channel opening and brush through the tip of the endoscope. Clean brush and repeat until clean.
- After brushing all the channels, flush thoroughly with GPD solution and drain.
- Fill the tray with disinfectant (2% gluteraldehyde or peracetic acid).
- Immerse the entire instrument in disinfectant and fill channels with disinfectant.
- Leave the endoscope immersed in disinfectant for the recommended time. Refer 8.4.2.
- Rinse the endoscope with sterile water. Flush channels with water and drain.

- Dry endoscope externally and flush air through channels to expel all residual fluid. 70% alcohol may be aspirated through the channels to hasten drying.
- At the end of the list, store in a well ventilated cupboard.

8.4.2 Immersion times for flexible endoscopes after cleaning

GI endoscopes	**Contact times**	
	2% Gluteraldehyde	**Peracetic acid**
- Before and end of session	20 min.	10 min.
- Between cases	20 min.	10min.
Bronchoscopes		
- Before and end of session - Between cases	60 min. 20 min	10 min. 10 min
- After use in patients with known or suspected TB	60 min	10 min.
Cystoscopes		
- Before and end of session - Between cases	20 min. 20 min	10 min. 10 min
- After use in patients with known or suspected renal TB	60 min.	10 min.
Laparoscopes, Arthroscopes, Nasophayngoscopes		
- Before and end of session - Between cases	20 min. 20 min	10 min. 10 min

- **Gluteraldehyde** solution must be changed after processing 20 endoscopes or every 14 days, whichever occurs first.
- **Peracetic acid** solution must be changed after processing 20 endoscopes or daily, whichever occurs first.

For storage, preparation and disposal refer 6.3 and 6.4.

8.4.3 Unit discipline

- High level disinfection of endoscopes should take place in a specified area which is properly ventilated and close to the place where the procedure is being performed.
- The endoscope should be decontaminated before the endoscopy list begins, between patients and at the end of the list.
- The person who is decontaminating the endoscopes should wear a plastic apron, rubber gloves and a mask.
- Eye protection with visors or goggles should be worn, if splashing is likely.
- Standard precautions should be practiced.
- Cuts/lesions on the hands and forearms of staff should be covered with a water proof plaster.

8.4.4. Occupational health

Exposure management and immunization, Refer Chapter 12

8.5 INFECTION CONTROL IN DIALYSIS UNITS

8.5.1. Design and layout

- Patients should have specific dialysis stations assigned to them
- Clean and contaminated areas should be separated. eg. medication should not be handled in the area where used equipment or blood samples are handled.
- Medications should be prepared and distributed from a central area

8.5.2. Handwashing and aseptic precautions

Please refer guidelines on hand hygiene (Chapter 5) and on aseptic procedures (Chapter 4).

8.5.3. Environmental cleaning and decontamination

- The dialysis station (chairs, beds etc.) should be cleaned after each use with GPD and wiped with 1% hypochlorite
- For routine cleaning refer 8.1.3.

8.5.4. Cleaning, disinfection and sterilization of equipment

Dialysis machine

- The machine should be cleaned carefully and thoroughly after dialysis is over with 1% hypochlorite.
- Special attention should be given to cleaning control knobs on the dialysis machines and other surfaces that are frequently touched and potentially contaminated with patient's blood with 1% hypochlorite.

Other equipment

- At the end of each dialysis treatment or dialysis shift, non-disposable equipment should be cleaned and disinfected or sterilized.
- Blood lines should be discarded into the sharps bin and sent for incineration.
- Non-disposable items of Hepatitis B positive patients should be labeled and sent to CSSD.

8.5.5. Unit discipline

- Staff members should adhere to standard precautions.
- Staff members should wear gowns, masks and eye wear for protection and to prevent soiling of clothing during initiation and termination of dialysis.
- Staff members should wear gloves when caring for the patient's equipment at the dialysis station and should change gloves before and after contact with each patient or station.
- Staff should wash hands between patients. If hands are not visibly soiled an alcoholic hand rub may be used.
- Sharing of ancillary supply instruments such as trays, blood pressure cuffs, clamps, scissors, and other non-disposable items should be avoided.
- Medication carts should not be used, so that the practice of sharing can be eliminated.
- When multiple dose medication vials are used, individual patient doses should be prepared in a clean area, away from dialysis station.
- Special care should be taken to prevent needle stick injuries or other injuries when handling sharps.
- Aseptic techniques should be used when handling vascular access.
- All staff members should receive a complete course of Hepatitis B immunization and their antibody status checked. Staff members who respond to vaccination do not require further vaccination / serology. (Refer 12.1)
- Non-responders (after second course of vaccine) and HBs Ag positive staff should not work in a haemodialysis unit.
- Staff members should not smoke, drink or eat in the dialysis treatment area.
- Patients may be served meals or eat food brought from home, if reasonable hygienic measures are taken.
- Used food utensils should be cleaned, in the usual manner, by the facility staff. No special cleaning of these items is needed.

8.5.6. Measures to prevent haemodialysis catheter associated infections.

- Catheter exit site should be examined at each haemodialysis treatment session for signs of infection.
- Catheter exit site dressing should be changed at each haemodialysis treatment.
- Dry gauze dressings and povidone iodine ointment at the catheter exit site are recommended whenever possible.

8.5.7. Additional preventive measures for bloodborne infections

Hepatitis B

- On admission to the unit, patients should be tested for HBs antigen and anti-HBc antibody.
- HBV vaccination is recommended for all susceptible patients on long term haemodialysis. Vaccination is recommended for pre-endstage renal disease patients, before they become dialysis dependant.
    - Recommended dose and schedule

      Dose: double dose

      Vaccine schedule: 0,1,2,6 months
- All vaccine should be tested for anti HBs antibody 2 months after the last primary vaccine dose.

  A **responder** is a person with adequate levels of serum antibody to HBsAg (ie., anti-HBs ≥10 IU/ml).

  A **non-responder** is a person with inadequate response to vaccination (ie., anti-HBs <10 IU/ml)

    - Responders should be re-tested annually and if the titre of anti-HBs antibody drops below 10 IU/ml a booster dose should be given.
    - Non responders should be offered a second course of vaccine.
    - Non-responders to the second course of vaccination should be checked monthly for HBs Ag.

- HBs Ag positive patients should be dialysed in a separate room using separate machine, equipment, instruments, supplies and medication designated for HBs Ag positive patients.
- Staff members who care for a HBs Ag positive patient, should not care for HBV susceptible patients while the HBs Ag positive patient is present in the unit.
- HBV immune patients may undergo dialysis in the same area as a positive patient. Staff members may care for both immune and infected patients at the same time.

Hepatitis C

- On admission to the unit, patients should be tested for anti-HCV antibody.
- Anti-HCV antibody negative patient should be re-checked every 6 months.
- HCV infected patients do not have to be separated from other patients or dialysed separately on dedicated machines.

HIV

- Routine testing of haemodialysis patients for HIV infection, for infection control purposes, is not necessary.
- The infection control precautions described above are sufficient to prevent transmission between patients. Additional measures are not required.

8.5.8. Standards for water quality, if dialysate is prepared in the unit

Haemodialysis fluid	Maximum Total Heterotrophs (CFU/ml)	Maximum Endotoxin level (EU/ml)
Water Used to prepare dialysate Used for reprocessing Dialysate	200 200 2000	No standard 5 No standard
Proposed AAMI Standard		
Water Dialysate	200 not determined	2 not determined

8.5.9. Waste disposal

Follow general guidelines on waste disposal. Refer Chapter11

8.5.10. Linen

Follow general guidelines on linen. Refer 6.7

8.5.11. Occupational health

Exposure management and immunization, Refer Chapter 12

8.6. INFECTION CONTROL IN THE BURNS UNIT

Burn wounds are at first free from bacteria, but are soon colonized by Gram-positive organisms (first 48 hours) and later by Gram-negative bacteria. In extensive burns, bacterial infection is the most important cause of morbidity and mortality.

8.6.1. Design and layout

- A burns unit should ideally be self-contained, with a dedicated theatre and intensive care unit.
- Patients with extensive burns will require rooms with both protective and source isolation precautions.
- Isolation rooms and the dressing room should, ideally, be mechanically ventilated with filtered air, which is extracted to the exterior.
- Window air extractors would be adequate for rooms for source isolation.
- The bathroom and the dressing room of a burns unit should be adjacent with designated traffic directions, so that the patient can be taken directly to the dressing room after a bath and to the unit after dressing.
- Contaminated dressings need to be taken away through separate doors to the dirty corridor.
- Facilities for hand washing and drying should be available at each bed.
- The trolley used to bathe burns patients should be specially designed for proper drainage of water.

8.6.2. Prevention of infection

Primary measures

- Primary excision and skin grafting and application of dermal template.
- Local treatment with appropriate antiseptics.
- Strictly adhere to hand hygiene and aseptic precaution.
  Refer chapter 4 and 5.

Secondary measures

- Burns should be cultured on admission and whenever dressings are changed
- Antibiotic therapy should be guided by culture and sensitivity tests.
- Tetanus toxoid should be given to all patients.
- General supportive measures are also important in secondary prevention.

8.6.3. Burns care

- Protective isolation of patients is important.
- Minimize staff and visitors entering the unit.
- Standard precautions should be practiced.
- Strict adherence to hand hygiene aseptic technique is important during wound dressing and invasive procedures. Refer chapters 4 and 5.
- Dressing of burns should, ideally, be performed in a mechanically ventilated room.
- Use sterile separate packs for each patient.
- Gloves should be used for handling the patient.
- Contact isolation precautions should be followed when caring for patients infected / colonized with multi-drug resistant organisms.
- Soap, for bathing patients, should be kept dry and restricted for individual use.

8.6.4. Environmental cleaning and decontamination

Floor	- Wet mop with GPD 2-3 times a day, starting from clean area.
Walls	- Damp dust with GPD once a week.
Horizontal Surfaces	- Damp dust with GPD daily and between patients. Dry with clean dry cloth.
Wash basins	- Clean with GPD twice a day.
Bath	- Bath is a potential source of Gram-negative infection, especially *Pseudomonas aeruginosa*. It should be cleaned with an appropriate disinfectant after each use. (e.g. non-abrasive powders containing hypochlorite).

Mattresses	- Cover with impermeable material - Damp dust weekly with GPD - Wipe with GPD between patients and dry thoroughly. - Replace torn mattresses. - Clean with GPD and 0.1% hypochlorite for septic patients.

8.6.5. Cleaning, disinfection and sterilization of furniture and equipment

Refer 8.1.4.

8.6.6 Supplies

- Adequate supplies of sterile dressing material, linen and clean mackintoshes should be available for bathing and dressing of each patient.
- Antiseptic solutions / creams should be readily available.
- Bottles containing solutions prepared in the ward for wound dressing should never be topped up. They should be emptied, washed and sterilized daily. At least 2 sets of screw-capped bottles should be available for this purpose.

8.6.7. Waste disposal

- Dressings removed from each patient should be collected and sealed in a separate bag in the bathroom and taken away through the backdoor into the dirty corridor.
- Follow general guidelines on waste disposal. Refer chapter 11

8.6.8. Linen

Follow general guidelines on linen handling. Refer 6.7

8.6.9. Occupational health

Exposure management and immunization, Refer chapter 12

8.7. INFECTION CONTROL IN GENERAL DENTAL PRACTICE

8.7.1 Design and layout of the unit

Should consist of three areas (designated as zones one, two and three respectively) and a sterile corridor for supply of sterile items

1. Zone one is the sterile area (the operating field)
2. Zone two consists of the area outside the operating field
3. Zone three is the area outside zone two

Zone one

- The operating field consists of the patient's mouth, dental light, triple syringe, head rest, bracket tube, hand piece and coupling rack and suction apparatus
- Surgical equipment required for the procedure are kept in this area
- These items should be in individual sterile packs
- Contaminated and sterile areas should be clearly defined

Zone two

- Outside the operating field, within clinical area
- In zone two, the sterile and contaminated materials are mixed

Zone three

- Contaminated instruments are kept in zone three before sterilization

All personnel in the unit should be aware of the zones in the clinical area

8.7.2 Hand washing, use of gloves and protective clothing

General hygiene	- Should be followed by all personnel in the dental unit - Avoid wearing jewellery (bangles, rings, wrist watches etc) during work - Cover skin abrasions and weeping eczematous lesions with water resistant plasters before procedures - Keep long hair tied - Keep nails short - Wear a dedicated, clean clinical coat inside the unit

Gloves	- Wear sterile, disposable gloves during all procedures. - Keep an adequate stock of sterile disposable gloves in the unit - Dispose blood stained gloves into clinical waste (yellow bags).
Handwashing and surgical scrubbing	- Wash hands with 4% chlorhexidine or 7.5% povidone iodine scrub before a non-surgical procedure, handling instruments, before and after routine wear of gloves or contact with a patient. - Surgical scrubbing of hands should be done before every invasive procedure - Dry hands with sterile pieces of cloth or tissues **Refer chapter 5**
Routine clothing and protective attire	- Wear uniforms depending on institutional policies - Wear protective attire during procedures: surgical gowns with a water resistant plastic apron, masks (triple layered, well fitting, disposable mask), eye shields (when splashing is expected) and gloves

8.7.3. Management of instruments

Instruments in critical and semi-critical areas	- Use individual sterile packs per patient. - Store in a sterile storage area, inside a waterproof, dry and insect proof cabinet. - Label packs with the date of sterilization and date of expiry. - Use the double pack method (two autoclavable pieces of cloth) - Use old stocks of sterile items first (stock rotation)

Local anaesthetic kit	- Use single use blister packs if possible. - If multidose vials are being used, keep a separate syringe and needle for each patient - Do not leave needle on the bottle. - Use a disposable syringe per patient (Leu lock type to avoid accidental splashing of local anaesthetic agent during infiltration) - Discard the remaining anaesthetic solution, left in the bottle, at the end of the day.
Materials for restorative procedures	- Mix materials in disposable paper pads or reusable glass blocks - Clean the glass blocks using GPD
Instruments for minor surgical procedures	- Use individual sterile packs - Cotton wool and surgical dressings should be sterilized by autoclaving.

8.7.4 Cleaning and disinfection

Cleaning and disinfection is essential for safe and risk free work.	
Before work	- Damp dust the dental unit and all horizontal surfaces with GPD
In between patients	- Manage blood spills according to the spills management protocol. (see below) - Wash instruments with GPD and running water wearing heavy-duty gloves (Refer 3.4.1). - Pack using the double pack method (two autoclavable pieces of cloth) and send to CSSD for sterilization
At the end of the day	- Damp dust the unit with GPD. If visibly blood stained, wipe with 0.1% hypochlorite
Blood spills	- Wear heavy duty gloves. - Soak up fluid using absorbent material (paper towels, gauze, wadding). - Pour 1% hypochlorite solution (10,000 ppm of available chlorine) till it is well soaked. Leave for at least 10 minutes.

	- Remove the absorbent material and discard as clinical waste. - Clean area with detergent and water and dry. - Discard gloves as clinical waste. - Wash hands.

8.7.5. Cleaning and disinfection of equipment

Bowls	- Wipe with GPD and dry
Old prostheses	- Wash with running water. - Clean with 0.1% hypochlorite followed by rinsing in 33% HCl diluted with an equal volume of water
Trays	- Clean with GPD
Spatula	- Autoclave
Glass blocks	- Wash with GPD, keep dry

8.7.6. Waste disposal

Follow general guidelines on waste disposal. Refer chapter 11

8.7.7. Linen

Follow general guidelines on linen Refer 6.7

8.7. 8. Occupational health

Exposure management and immunization, Refer chapter 12

8.8 INFECTION CONTROL IN OPHTHALMOLOGY UNITS

8.8.1. Handwashing and aseptic precautions

Please refer guidelines on hand hygiene (Chapter 5) and on aseptic procedures (Chapter 4)

8.8.2. Cleaning, disinfection and sterilization

Tonometer prisms, other prisms and lenses	Immediately upon removal from patient's eyes, thoroughly rinse in water. Place a few drops of mild soap on a moistened cotton ball and gently clean with a circular motion. Thoroughly rinse in water and dry carefully with a non-linting tissue. Soak in 2% glutaraldehyde for 20 minutes or 1% hypochlorite for 10 minutes Rinse with sterile water Wipe and store dry.
Prism holder	- Should be washed and dried at the end of each day

8.8.3 Infection control in outbreaks of conjunctivitis

- Out patients with conjunctivitis should not be examined in the ward.
- A separate room should be allocated for examination of patients with red eyes.
- Hand hygiene should be strictly followed.
- Disposable gloves should be used to examine each patient.
- Avoid tonometry. If essential, use a non-contact, air puff tonometer.
- All tonometer prisms should be disinfected. Refer 8.8.2
- Slit lamp heads used in the examination of patients should be cleaned with soap and water.
- All other non metallic equipment used in examination should be immersed in freshly prepared 0.01% hypochlorite solution (125 ppm) (Milton solution) for 10 minutes.
- Ideally, each patient should have individual eye drops. Alternatively, ensure careful dropping to avoid any contact between the dropper and patient's skin or eye. In-ward patients should have dedicated eye drops at bed side.
- Conjunctival swabs for virus isolation should be taken and transported to the reference laboratory (MRI) in virus transport medium.

Contact: Department of Virology, Medical Research Institute regarding collection and transport of specimens Tel: 0112697280/ 0112693532-4

8.9. INFECTION CONTROL IN POST-MORTEM ROOMS

8.9.1. General precautions

- Wear protective clothing: surgical top and trousers, surgical gown, disposable aprons, double gloves and long boots. Wear a standard surgical splash proof mask *and not a gauze mask* and eye protection.
- Adhere to standard precautions. Refer chapter 3

- For patients with a strong suspicion or diagnosis of airborne infections such as TB, measles, N95 masks should be worn, if available.
- After the post mortem, remove protective clothing and discard into linen bin for laundering. Take a shower before leaving the room.
- Work surface should be wiped with 1% hypochlorite.

8.9.2. Cleaning of instruments

- Thorough cleaning with GPD and water will remove most microorganisms.
- Wear personal protective equipment (plastic apron, heavy duty gloves)
- The sink should be deep enough to completely immerse the equipment.
- Remove any gross soiling on the instrument by rinsing in tap water.
- Immerse in water with detergent.
- Instrument should remain below the surface of the water while brushing and cleaning. Take precautions to prevent splash and injury.
- Ensure all visible soiling is removed from the instrument.
- Rinse and dry the instrument. Inspect to ensure the instrument is clean.

8.9.3. Handling of infected bodies

- Adhere to standard precautions. All staff handling the dead body and soiled linen should wear gloves.
- The body should be handed over to the relatives without any delay.
- The body should not be handled unnecessarily. Inform the relatives to dispose, bury or cremate as early as possible.

- Funeral parlours and morticians must be informed about biohazard Embalming of bodies not recommended. However, if it is essential the undertaker should be advised to wear protective clothing, mask, gloves and boots during preparation of the body to prevent contamination.
- Sealing the coffin is not required.
- Relatives should be strongly discouraged from embracing or hugging the body.

- The preparation area, and any place or item which is contaminated with body secretions should be disinfected with 1% hypochlorite solution.
- The patients clothing, bed linen, and other personal items should be washed with soap and water and boiled before reuse.
- Advice may be sought from Infection Control Team (ICT) regarding safe management of the patient's personal effects etc.
- Emotional and religious wishes of the relatives should be taken into account

8.9.4. Waste disposal

Follow general guidelines on waste disposal. Refer chapter 11

8.9.5. Linen

Follow general guidelines on linen Refer 6.7

8.9.6. Occupational health

Exposure management and immunization, Refer chapter 12

8.10 INFECTION CONTROL IN THE LABORATORY

8.10.1 Laboratory design and layout

Design	- Should have separate reception area for specimen collection, processing area, area for preparing and storage of culture media and a decontamination and washing area. - Separate sink for hand washing should be available.

	- Should have adequate work space - Should be located away from general wards, operating theatres and busy corridors - Should have separate eating and resting areas for the laboratory staff - The universal biohazard sign should be displayed at the entrance (Figure 3)
Work benches and general area	- Floor should be easily washable (tiles or terrazzo preferable) - Bench tops should be made of water resistant scratch proof material to withstand routinely used chemicals - Walls, tiled up to six feet or more - Minimum number of horizontal surfaces
Access to laboratory	- Access through one entrance - Only authorized personnel allowed - Children should be restricted

8.10.2 General safety measures

All laboratory personnel	- Keep long hair tied - Do not wear bangles and wrist watches while working - Do not eat, smoke or drink inside the laboratory - Do not put fingers, marker pencils, bacteriological loops etc into the mouth - Do not drink from laboratory glassware
Hand hygiene	Refer chapter 5 .

8.10.3 Clothing and protective attire

All laboratory personnel	- Should wear white laboratory coats. - Water proof aprons and masks, when necessary - Do not go outside the laboratory wearing laboratory clothing.

8.10.4 Safe laboratory practices

Pipetting and suctioning	- Do not mouth pipette. Use mechanical devices for pipetting. - Use techniques which generate a minimal amount of aerosols. - Work inside a safety cabinet, when necessary. - Plug all pipette ends with cotton wool - Do not bubble air through solutions during pipetting - Use pipettes which do not need expulsion of the last drop - Do not keep used pipettes on the tables, Discard into a jar containing disinfectant (2% Lysol solution or hypochlorite 2500ppm). Maintain the fluid level at 2/3rd of the container
Handling of sharps	Refer 3.7.1.
Opening of vials and containers	- Preferably within a safety cabinet - Open rubber stoppers gently so as to minimize aerosolization - Open tight fitting lids using gauze covering
Handling of specimens	- Accept only non leaking samples - Contaminated request forms should be discarded and replace with a new form
While working in the laboratory	- Do not place contaminated articles on the bench tops - Operate homogenizers, centrifuges, sonicators and shakers carefully, to minimize the risk to the operator and others. - Minimize generation of aerosols during procedures - Work inside a safety cabinet, when necessary - Ideally, a Bunsen burner should not be kept inside a safety cabinet.
Centrifuges	- Should be used carefully. - Test tubes/ bottles should not be cracked or chipped, to avoid breakages and should only be 2/3rd full to avoid spillage. - These should be capped or plugged with cotton wool so that aerosols are not created. - Balancing and loading will avoid breakages. - The lid of the centrifuge should not be opened till it has stopped

	rotating and any aerosols have settled

8.10.5 Cleaning and Disinfection

Bench tops	Wipe with 2% Lysol , 0.1% hypochlorite or 70% alcohol before work and at the end of the day
Floor	Wet mop with GPD twice daily
Sinks/ wash basins	Clean with GPD
Surface of instruments	Damp dust or use an agent as recommended by the manufacturer
Refrigerators	Wipe with GPD monthly
Safety cabinets	Wipe surface with 70% alcohol Switch on the UV light for 30 minutes before and after work. The UV light should be switched off before using the cabinet Periodic fumigation with formaldehyde as recommended by the manufacturer
Centrifuges	Wipe with 2% Lysol and rinse/wipe thoroughly with water weekly
Waterbath	Change water daily
Incubator	Wipe with GPD monthly

8.10.6 Management of laboratory accidents

Decontamination of skin	Wash thoroughly with soap and water.
Decontamination of cuts/eyes	Irrigate with water, taking care to prevent spread of contamination from one area to another.
Spills	Heavy duty gloves and apron should be worn. The total spillage area including the broken container should be flooded with disinfectant and left undisturbed for 10 minutes prior to mopping with cotton wool, wadding or toilet paper or any other absorbent material. For most organic matter and bacteria 2% Lysol is suitable. For blood or viruses 1% hypochlorite should be used. If a dust pan and a brush have been used, these too,

	require disinfection.
Breakages in centrifuge	*If you open the centrifuge after a run and see that a tube containing biohazardous material has broken*: Close the centrifuge top immediately Allow the aerosol to settle down Clean the spill with disinfectant *If you suspect a breakage*: Turn off the power immediately and allow the centrifuge to stop without braking. Allow the aerosol to settle down Clean the spill with disinfectant

8.10.7. Waste disposal

Refer 11.3.

8.10.8. Occupational health

All laboratory workers should undergo training in safe laboratory practices. All accidents should be recorded in an accident register. Vaccinate the staff against hepatitis B, other potential vaccine preventable diseases when applicable and rabies where rabies work is done. Exposure management and immunization, Refer chapter 12

Figure 3. Universal biohazard sign

CHAPTER 9

INFECTION CONTROL

IN

OPERATING THEATRES

CHAPTER 9

INFECTION CONTROL IN OPERATING THEATRES

9.1 THEATRE ATTIRE

All staff working in the theatre should remove outdoor clothing before wearing the theatre uniform. Staff entering the recovery room /anaesthetic room only, do not need to change into theatre uniform.

Footwear

- Footwear with impervious soles should be worn in the sterile zone.
- These shoes should fit properly. Dedicated personalized footwear is better for all regular staff.
- These should be cleaned regularly, at least once a week.

Caps

- The theatre staff should keep the hair clean and tidy.
- All the staff in the operating room (includes lay up room also) should wear disposable or autoclavable caps, properly covering hair.

9.1.1. Scrub team

Wristwatches and jewellery

- These should be removed before scrubbing.

Sterile Theatre gowns

- The scrub team should wear sterile theatre gowns.
- Theatre gowns should ideally be made of waterproof, disposable material or tightly woven material. These types of gowns are costly to use. Currently used conventional cotton clothing gives some protection against contact contamination if dry, but skin scales carrying bacterial particles can escape through the large pores in cotton fabric. If cotton gowns are used, they must be changed whenever they become soaked with blood or other liquids.
- Gowns should be wrap-around type.

Plastic aprons

- Plastic aprons should be worn under the sterile theatre gowns by the scrub team for additional protection.

Face masks (standard surgical splash proof masks)

- The scrub team should wear masks. However, this is controversial.
- Ideally, the masks should be disposable and act as filters. The mask should completely cover the nose and the mouth.
- Touch only the tapes when tying or removing. *Avoid touching the mask with gloved hands.*
- The mask should be changed after each operation, after 4 hours in prolonged surgery and whenever it becomes contaminated or damp.

Visors and Goggles

- Full-face visors or protective goggles/glasses should be worn for the surgery with high risk of splashing blood or body fluids.

Sterile gloves

- Wearing double gloves during surgery, protects the wearer from infections. Double gloves should be worn specially for traumatic surgery such as orthopaedic surgery.
- On the appearance of a visible tear or puncture, gloves must be removed and replaced with new ones after washing the hands with an antiseptic detergent. The gown should also be changed when changing the gloves.

9.1.2 On leaving the operating theatre

- Staff must not leave the operating theatre without changing into ordinary clothes.
- Theatre staff who leaves the theatre for urgent matters (eg: crash calls, ICU calls), should change their theatre clothing on return.

9.1.3. Patient attire

- The patients should wear clean, light coloured clothes, a cap and leggings.

9.2 THEATRE DISCIPLINE

9.2.1. Scrubbing and dressing

- Scrubbing and dressing should be done in designated places
- **Surgical hand scrub**
    - Remove all jewellery before scrubbing
    - Nail brush should be used **only** for the first hand wash of the day to remove debris from underneath nails.
    - Apply 3-5 ml of antiseptic detergent (eg. 4% chlorhexidine or 7.5% povidone iodine) to moisten the hands and forearms and scrub for approximately 3-5 minutes
    - The disinfection process must be thorough and systematic, covering all areas of the hands and forearms.
    - Do not use brushes.
    - Hands should be held high while washing with water
    - Initial scrub should last for 3 - 5 minutes. In between cases, scrubbing should last for 2 - 3 minutes.

9.2.2. Discipline in the theatre

Entry

- Keep to a minimum

Doors and windows

- Doors should be kept closed while operating
- Minimum door opening and closure
- Windows are not suitable for an operating theatre. If any, should be kept closed

Theatre behaviour

- The number of people inside the theatre should always be kept to a minimum (10,000 skin scales / person/minute).
- Scrubbed staff should minimize movements inside the theatre before starting the operation.

- Have everything ready before starting
- Surgeons should not handle the lights with gloved hands.
- Unnecessary movement in and out of the theatre of other staff during operations should be avoided.
- Restrict conversation in the theatre

Visitors

- Restrict visitors. Visitors who enter the operating theatre for a brief visit, eg: parents who accompany children until they are anaesthetized, paediatricians who attend the babies after caesarian sections, should change their shoes and wear a sterile overall over outdoor clothing.
- Other visitors who stay in the theatre for a prolonged period should completely change into theatre clothing.

9.2.3. Management of infected patients

- Ward staff should inform the head of the surgical team of any infection risk in a particular patient (MRSA, HIV, HBV).
- Surgery on known infected patients (eg. MRSA) should be performed at the end of the list.
- *Theatres should not be closed/fumigated after surgery on patients with tetanus and gas gangrene*. Perform as the last case. Clean theatre thoroughly afterwards.

9.2.4. Storage of equipment

- Equipment should be kept to a minimum. eg. operating table, operating light, anaesthetic machine, suction apparatus, trolley.
- Sterile packs should be kept in a cabinet or box with a well fitting lid.
- Laying-up of trolleys in advance is a risk.
- Wrappings to be removed in the operating room immediately before used.
- Theatre trolley should remain in operating theatre and ward trolley should not enter into operating theatre.

9.3. THEATRE CLEANING

9.3.1. General cleaning

Daily cleaning

- Cleaning should be carried out at the end of a list or when necessary eg soiling of the floor
- Floor should be wet mopped using GPD and water Dedicated mops should be used for each area of the theatre. Wash mops in soapy water, dry in sunlight and hang.
- Walls should be cleaned only if there is any splash.
- Theatre table should be cleaned at the end of the list with GPD.
- Theatre lights above the theatre table should be cleaned with a damp cloth and GPD. If contaminated with blood or body fluids disinfect with 70% alcohol
- Trolley used for opening surgical packs should be wiped clean with 70% alcohol and allowed to dry

Once a week or Sunday cleaning

- Clean all horizontal surfaces eg. ledges, window sills, lights, light switches and A/C grills.
- Clean the theatre table using GPD.
- Taps in scrubbing area should be cleaned with a detergent
- Walls up to head height can be cleaned. Additional wall washing should be performed when there is visible soiling.

Once a month cleaning

- Do all routine maintenance like repairing doors etc.
- Entire walls and fittings should be cleaned.

9.3.2. Theatre equipment

Instruments

Cleaning is the first step in the decontamination process. It must be carried out before disinfection and sterilization to make these processes effective.

- Wear personal protective equipment (plastic apron, heavy duty gloves)
- All instruments which are reused (eg. forceps, retractors) should be washed with GPD and running water (preferably water 45^{o} C).
- Thorough cleaning with GPD and water will remove most microorganisms.
- The sink should be deep enough to completely immerse the equipment.
- Take instrument apart fully and immerse all parts in warm water with detergent. Follow the manufacturer's instructions.
- Instrument should remain below the surface of the water while brushing and cleaning. Take precautions to prevent splash and injury.
- Ensure all visible soiling is removed from the instrument.
- Rinse and dry the instrument.
- Inspect to ensure the instrument is clean.
- Keep cleaning equipment (brushes and cloths) clean and dry between uses.
- Pack instruments for CSSD. Make sure to put steritape inside and outside, and date and initialize. When you receive the pack after sterilization check the steritape.
- Packs should be dry after sterilization.

Suction bottles and tubing

Refer 6.6.2

Oxygen masks

- Use GPD to clean mask and wipe with 70% alcohol
- If used on a patient with/suspected TB, immerse in 1% hypochlorite solution for 30 min and rinse with water.

Kidney trays

- Autoclave

Gloves

- Use sterile disposable gloves for surgical team.
- Use heavy duty gloves for staff doing the cleaning. These should be immersed in 1% hypochlorite, washed and hung to dry at the end of the day.

Foot wear

- Wash with soap and water and dry regularly at least once a week.
- If there is a spill immediately remove and soak in 1% hypochlorite and send for washing

Goggles

- Wash with soap and water. Clean with 70% alcohol swab

Nail brushes

- After use soak in warm soapy water, rinse and autoclave.

Mackintosh

- Immerse in 1% hypochlorite then wash with soap and water
- Hang to dry

Metal or red rubber urinary catheters

- Autoclave

Buckets

- Should be lined with appropriately covered bin liner (Refer waste management in chapter 11)
- At the end of the day wash with soap and water or detergent and store inverted for drying.
- If contaminated with blood or body fluids wipe with 1% hypochlorite.

9.3.3. Management of blood spills

Refer 3.5.1

9.3.4. Theatre linen

Refer 6.7

9.3.5 Waste disposal (including body parts)

Refer Chapter 11

9.4. CLEANING AND DISINFECTION OF ANAESTHETIC EQUIPMENT.

- Responsibility for decontamination of anaesthetic equipment should be vested in one individual, ideally a member of the theatre nursing staff.
- This person should be well trained in cleaning, drying, packing for sterilization, proper disinfection, sterilization and storage of anaesthetic equipment.
- Clearly designated area near the operating rooms should be organized for this purpose with adequate space, sink and running water.

9.4.1. Risk of contamination of parts of the anaesthetic machine

- **Constantly contaminated items**
  - Laryngoscope blades, oropharyngeal airways, laryngeal masks, endotracheal tubes and suction catheters.
- **Frequently contaminated items**
  - Face masks, adaptors, and portions of the breathing systems closer to the patient.
- **Least contaminated items**
  - Components remote to the patient eg. Anaesthetic machine.

9.4.2. Cleaning and disinfection of individual items.

Anaesthetic carts and gas cylinders

- The top and front of the anaesthetic cart should be wiped with a detergent at the end of the day and a clean cover should be placed on the top.
- Blood or secretions should be wiped off promptly with 70% alcohol.
- The entire cart should be cleaned once a week. All equipment should be removed including the drawers and washed with a detergent and water, and then wiped dry.
- Gas cylinders should be washed with water and a detergent and wiped with a cloth whenever a new cylinder is connected.
- *Alcohol should not be used to clean as it is a fire risk.*

Anaesthetic machine

- The anaesthetic machine should be considered as an operating room furniture and receive the routine cleaning at the end of the list. Horizontal surfaces should be cleaned properly.
- Thorough surface wiping should be done with a soft cloth, dampened with soap and water or a mild detergent. Special attention should be paid in cleaning around the knobs, vaporizers, cylinders etc.
- External filters should be changed between patients.

Absorber and unidirectional valves

- Manufacturer's instructions should be followed when disassembling, cleaning and disinfecting.
- The absorbent should be removed from the absorber.
- The canister should be cleaned with water and a detergent. Ideally, it should be immersed in 2% glutaraldehyde for 30 minutes and rinsed with clean water and completely dried before refilling

.

The reservoir bag

- Reservoir bag is usually connected near the absorber and is usually protected from contamination by filters.
- Single use bags are preferred.
- For reuse, cleaning can be done by partially filling the bag with water and detergent and shaking the bag, and then rinsing with sterile water. Outer surface is washed with water and a detergent and dried.
- Disposable bags may be preferred on patients with known or suspected infections such as tuberculosis.
- If not disposable bags used on such patients should be autoclaved (if autoclavable).Alternatively, chemical disinfection using 2% glutaraldehyde for 30 minutes, followed by adequate rinsing with sterile water can be done.

Tubing

- Tubes should be rinsed under running water, soon after use, and soaked in a large container filled with water and detergent.
- Inside should be brushed. If brush is not available clean by pouring the detergent into one end and agitating in a seesaw manner.
- Autoclave (if autoclavable) or use high level disinfection by immersing the tubing in 2% gluteraldehyde for 30 minutes or peracetic acid for 10 minutes and rinsing with sterile water.
- Store clean tubing dry and covered

The Y piece

- This is contaminated in high percentage of cases.
- Cleaning should be done after use. The Y piece should be removed from the tubing, rinsed under running water and placed in a solution of water and detergent. The inside should be scrubbed manually.
- It should be properly dried before disinfection.

Metal Y pieces - Autoclave or immerse in 2% glutaraldehyde for 30 minutes or in peracetic acid for 10 minutes and rinse thoroughly with sterile water.

Plastic Y pieces - Immerse in 2% glutaraldehyde for 30 minutes or in peracetic acid for 10 minutes and rinse thoroughly with sterile water.

Non re-breathing valves

- Follow manufacturer's instructions

Face masks

- One of the most frequently and heavily contaminated pieces of equipment.
- Immediately after use, mask connector should be removed and the mask rinsed in tap water and scrubbed (using brush). It should be rinsed and dried.
- Autoclave (before autoclaving the plug should be removed)
- Alternatively immerse in 2% glutaraldehyde for 30 minutes or in peracetic acid for 10 minutes and rinse thoroughly.

Oropharyngeal airways

- They are heavily contaminated after the use.
- Rinse under running water as soon as possible after use and then place in a solution of water and detergent. Clean with a brush, both inside and outside, and rinse thoroughly.
- Metal airways should be autoclaved and others immersed in 2% glutaraldehyde for 30 minutes or in peracetic acid for 10 minutes and rinse thoroughly.

Laryngoscope blades, stylets and intubating forceps

- As soon as possible after use should be rinsed in water and detergent.
- Ideally autoclave. Alternatively wipe with 70% alcohol.
- Wipe hand piece with 70% alcohol. Store dry.
- Rinsing and wiping thoroughly with 70% alcohol may be adequate during a heavy list.
- For fibro-optic laryngoscopes, the manufacturer's instructions for cleaning should be followed.

Endotracheal tubes and laryngeal masks

- Ideally single use.
- Rinse under running water as soon as possible after use and then place in a solution of water and detergent so that secretions do not dry. Inflate cuff fully and clean with a brush, both inside and outside, and rinse thoroughly.
- Immerse in 2% glutaraldehyde for 30 minutes or in peracetic acid for 10 minutes and rinse thoroughly.
- Store clean tubes dry and covered.

CHAPTER 10

MANAGEMENT

OF

OUTBREAKS

CHAPTER 10

MANAGEMENT OF OUTBREAKS

INTRODUCTION

What is an outbreak?

- Two or more associated cases of infection with identical organisms that are linked in time and place

or

- A greater than expected rate of illness compared with the usual background rate for the population at the place and time where the outbreak has occurred.

An outbreak needs investigation to find out the route of transmission and possible sources in order to prevent further spread.

If an outbreak is suspected, ward staff should immediately **inform** the Infection Control Team (ICT) or Infection Control Nurse (ICN), who should visit the unit concerned.

10.1 MANAGING AN OUTBREAK

STEP 1

Recognition of an outbreak

1. **Preliminary investigation**
   - Develop a case definition, which includes site, pathogen and affected population.
2. **Verify diagnosis**
   - By reviewing each case with the definition.
3. **Determine the magnitude of the problem**
   - Number of cases and the severity
4. **Confirm that an outbreak exists**

- By comparing the present rate with endemic rate.

Take immediate relevant control measures

- Study the available information to identify relevant control measures.
- Review and strengthen the relevant infection control practices e.g. hand washing, isolation, environmental cleaning, aseptic procedures, disinfection and sterilization
- Stop transferring patients and staff to other wards
- Restrict visitors.

STEP 2

Notification of outbreak

Notify the Infection Control Committee, hospital administration, relevant departments and epidemiological unit. Educate the staff, patients and visitors.

Outbreak Control Committee

ICT may consider forming an **Outbreak Control Committee** depending on the nature and magnitude of the outbreak.

This committee should

- Meet regularly until the outbreak is under control
- Major decisions such as ward closure should be taken by this committee.
- Designate a person to work with media if necessary.

STEP 3

Active case finding

Search for the additional cases by using clinical and microbiological records

Microbiological investigations

Microbiological investigations should be done depending upon the suspected epidemiology of the causative organism. Consult the Microbiologist or obtain off-site microbiologist's opinion to decide on appropriate specimens.

Epidemiological typing

Typing of the aetiological agent could be done depending on the facilities available.

Line listing

Prepare a data collection tool eg questionnaire.

Record all the cases noting patient details, date and time of onset of symptoms in each case, date of admission, place, infection details etc.

Data Analysis

Analyze the data to identify common features of the cases. e.g. age, exposure to risk factors

An epidemic curve (eg histogram) should be developed based on place and time of occurrence of cases (time in the x axis and number of cases in the y axis). This helps to determine common source, probable time of exposure, probable incubation period etc.

Formulating and testing a hypothesis

Formulate a hypothesis about suspected causes for the outbreak based on literature survey and common features of cases.

Hypothesis is tested by a case control study, cohort study or microbiological study to delineate the problem and identify the source.

- Case control study – a group of uninfected patients (control group) is compared with infected patients (case group)
- Cohort study – a defined high risk population (cohort) is identified and followed prospectively.
- Microbiological study – planned according to the known epidemiology of infection problem. This identifies possible sources and routes of transmission

STEP 4

Control Measures

Strengthen specific control measures as soon as the cause of outbreak is identified.

These may include,

- Identification and elimination of the contaminated product
- Modification of nursing procedures
- Identification and treatment of carriers
- Correction of lapses in technique or procedure

Monitor

Continue follow up of cases after the outbreak clinically as well as microbiologically.

Evaluate

Evaluate for the effectiveness of control measures. Cases should cease to occur or return to the endemic level.

Document the outbreak.

Prepare a report on the investigation and management of the outbreak and present to the infection control committee, departments involved and the administration.

10.2 MANAGEMENT OF A METHICILLIN RESISTANT *STAPHYLOCOCCUS AUREUS* (MRSA) OUTBREAK

Methicillin resistant *Staphylococcus aureus* (MRSA) is resistant to all beta lactam antibiotics, including penicillin, cloxacillin, co-amoxyclav and carbepenams.

Similar to methicillin-sensitive strains of *S. aureus* (MSSA), MRSA can colonise skin, mucous membranes and skin lesions in patients and health care workers but is liable to cause infection in susceptible patients.

Compared to MSSA infections, MRSA infections are difficult and costly to treat.

10.2.1 Transmission of MRSA

(a) Contact spread

Hands – Transient hand carriage by staff is the most likely route of spread from patient to patient.

Skin conditions – Eczemas, dermatitis, psoriasis or cuts and wounds of staff can harbour and transmit the bacterium. Paronychia in staff members could also be a source of infection to patients.

Equipment – MRSA can spread when incorrectly decontaminated equipment are used between patients.

(b) Airborne spread (less commonly)

Skin scales of infected patients or staff can infect others. If a patient with a productive cough is colonised or infected, his/ her sputum is a source of infection.

10.2.2 Preventing spread of MRSA

Isolation

- Move the patient to a side-room, if available (source/containment isolation).
- Explain the reason for isolation to the patient.
- If patient is isolated in a side room the door should be kept closed especially, during procedures like physiotherapy, wound dressing and bed making.
- When isolation is not possible, patients harbouring MRSA could be cohorted in a corner of the ward beside a washbasin/sink (cohort isolation), ideally away from patients with invasive devices such as catheters, IV infusions.
- Ideally, a dedicated hand-washbasin should be available for these patients.
- Any lesion from which MRSA is isolated should be covered with a clean dressing
- Continue isolation until 3 complete sets of negative swabs are obtained. There should be at least 3 days between each set of swabs.

Barrier nursing

- Preferably, one nurse should be allocated for patient or for the cohort.
- Strict handwashing practices should be adhered to **before** and **after** attending on patients. Antiseptic hand wash and running water must be made available.
- Do not enter room unnecessarily.
- Clean gloves and aprons should be worn by the staff attending to the patient.
- Discard used gloves and aprons into a bin within the isolation area
- Masks are not indicated (exceptions – procedures producing aerosols such as chest physiotherapy, suction, bronchoscopy, during wound dressings or when attending to patients with infected sputum)
- Do not lean / touch bed, furniture etc

Equipment

- A dedicated stethoscope, thermometer, blood pressure cuff etc should be kept in the room or isolation area, and cleaned appropriately after use.
  Refer 6.6.5

Isolation room / Area

- Should be cleaned daily, including bed, bedside cupboard, table, floor etc. Mop/wipe with 0.1 % hypochlorite.

Linen

Refer 6.7

Movements

- As far as possible minimize visits to other units / departments. If the patient is to visit another unit such as physiotherapy or radiology, inform before hand to take necessary precautions, such as wearing gloves and aprons.
- While handling MRSA patients, staff should avoid direct contact with other patients

Transfers

- MRSA patients should not be transferred to other wards or hospitals without informing the ICT and the ward or hospital concerned.
- MRSA status should be clearly indicated in the transfer form / bed head ticket.
- Colonised patients fit to be discharged can be sent home.

Medical records

- Medical records of affected patients should be flagged.

Visitors

- Patients must be told that there is no risk to healthy relatives and friends.
- Restrict visitors
- Visitors do not need protective clothing if they do not attend to the patient.
- Sitting on the patient's bed should be strictly prohibited.
- Visitors should wash their hands before leaving the patient's room.
- Bystanders assisting the patient should wash hands with antiseptic hand wash, and also ideally, wear gloves and gowns.

Staff screening

- This is confined to outbreaks in special care units and surgical wards. Instruction should be obtained from ICT regarding screening.

10.2.3 Patient management

Treatment

- Patients infected with MRSA should be treated with relevant antibiotics guided by an antibiotic sensitivity test.

Screening

Patients should be screened for colonization as follows:

- Nose – both nostrils swabbed with one swab
- Perineum or groin – both sides swabbed with one swab
- Axilla – both axillae swabbed with one swab
- Throat
- Skin lesions – swabbed as wounds, ulcers, rash, IV or drain site
- Catheter Specimen of Urine – if indwelling catheter present
- Sputum – if productive

Swabs are moistened with sterile saline before obtaining specimen.

Eradication

The Microbiologist should be consulted before instituting eradication protocol.

Colonized patients should undergo a 5 Day MRSA Eradication Protocol:-

- Daily baths with 4% chlorhexidine in detergent solution or 4% povidone iodine applied neat to the skin with a wash cloth.
- On days 1, 3, 5 wash hair with 4% chlorhexidine or 4% povidone iodine followed by normal shampoo.

- Apply 2% mupirocin nasal ointment to anterior nares three times per day. A match-head size portion of ointment/cream to be applied to each nostril using a disposable cotton swab. Alternatively, chlorhexidine cream, neomycin / chlorhexidine cream or povidone iodine cream can be used.
- Apply 2% mupirocin on colonised or infected skin lesions (avoid use on deep/extensive wounds)
- Change personal clothing and bed linen daily.
- After 5 days stop eradication treatment.
- 48 hours after completing eradication protocol, repeat the screening. If patient has had antibiotics for MRSA do not re-screen till 48 hours after IV treatment has ceased.

Discharging a MRSA patient

- When discharging a MRSA colonised patient, write on the diagnosis card- "MRSA Positive patient – On admission, isolate and inform ICT"
- If MRSA has been eradicated write on the diagnostic card – "MRSA Positive patient – MRSA eradicated, inform ICT for screening"

Re-admitting a MRSA patient

- On readmission isolate the patient and inform ICT.

10.3. MANAGEMENT OF OUTBREAKS OF RESPIRATORY TRACT INFECTIONS

Reservoir of infection

Patients with clinical or subclinical infections/ carriers / patients with latent infections

Mode of transmission

Direct –Airborne spread (droplet nuclei <5μm)

Droplet spread (droplet nuclei >5μm)

Oral contact

Indirect – By hands and fomites contaminated with respiratory secretions of infected patients (eg. handkerchiefs, eating utensils). Organisms may survive for many hours on contaminated environmental surfaces.

10.3.1 Management of an outbreak of respiratory infection

- Discharge other patients, if they can be managed as outpatients.
- Source isolation should be done in a single side room, until clinical recovery. If this is not possible, cohort isolation with barrier nursing is an alternative.
- Avoid over crowding and maintain adequate ventilation.
- Keep visitors to minimum.
- Strictly adhere to standard precautions.
- Protective masks may be useful for close contacts. The mask should be a standard surgical splash proof mask *and not a gauze mask.* Alternatively a three layered mask with gauze/polyethene/gauze could be used.
- Contact precautions should be practiced when carrying out invasive procedures or handling secretions.
- Stethoscope, thermometers, nebulizer masks and other equipment, should be used for a single patient as far as possible without sharing between patients. These should be regularly cleaned and disinfected (refer chapter 6)
- Spillage of respiratory secretions – manage as for blood spills (refer 3.5.1)

- Specimens for microbiological investigations (nasopharyngeal aspirate, sputum, bronchoalveolar lavage, throat or nasal swabs) should be collected as early as possible and sent to the laboratory in viral transport media in leak proof containers. Blood (acute and convalescent samples) should be sent for serology.

  Contact: Department of Virology, Medical Research Institute regarding collection and transport of specimens. Tel: 0112697280/ 0112693532-4
- Specific treatment or prophylaxis may be indicated in immunocompromised and high risk patients.
- Staff with symptoms should not attend on high risk patients.
- Educate staff, bystanders and patients regarding personal hygiene, frequent hand washing, covering the nose and mouth while sneezing or coughing and sanitary disposal of oral and nasal discharges.

10.3.2 Management of an outbreak of severe respiratory infection (eg SARS)

- Inform ICT/ICN
- Isolate the patient in an isolation room or transfer to Infectious Disease Hospital (IDH).
- Isolation room doors must be kept closed at all times and staff entering the room must be kept to a bare minimum.
- A dedicated stethoscope, thermometer, blood pressure cuff etc should be kept in the room or isolation area, and cleaned appropriately after use.
  Refer 6.6.5
- Practice barrier nursing (refer 10.2.2)
- All health care workers including the minor staff should be trained on infection control measures. A member of the staff (eg. Matron) should be identified to observe whether the procedures are carried out correctly.
- Strictly adhere to standard precautions. Handwashing is crucial.
- Contact precautions must be practiced when handling the patient or secretions or the immediate environment and cleaning.
- Single use disposable personal protective equipment must be used, as far as possible, when handling the patient. For all patient contacts and invasive

procedures wear eye protection (goggles/visor). If any items are to be reused, disinfect immediately.

- Special protective masks with high efficiency filters, at least an "N-95" mask must be worn when performing aerosol generating procedures. eg. bronchoscopy, intubations, suction and close handling of the patient. (These procedures should be performed only if absolutely essential).
- For those entering the room a surgical mask with plastic covering is adequate.
- Keep visitors to a minimum. If they are to enter the room, they need to wear personal protective equipment (refer 3.3). Hand washing before leaving is crucial.
- Specimens for microbiological investigations (nasopharyngeal aspirate, sputum, bronchoalveolar lavage, throat or nasal swabs) should be collected as early as possible and sent to the laboratory in viral transport media in leak proof containers. Blood (acute and convalescent samples) should be sent for serology.

  Contact Department of Virology, Medical Research Institute regarding collection and transport of specimens. Tel: 0112697280/ 0112693532-4
- Spillage of respiratory secretions – manage as for blood spills (refer 3.5.1)
- Linen (refer 6.7)
- Waste disposal (refer chapter 11)
- If a member of staff develops fever or respiratory symptoms within 10 days of caring for a patient immediately report to the ICT/ICN. During this period avoid contact with other patients or staff members.

10.4 MANAGEMENT OF OUTBREAKS OF GASTROENTERITIS, FOOD POISONING AND ANTIBIOTIC ASSOCIATED DIARRHOEA

10.4.1. Management of an outbreak of diarrhoea

Inform the Infection Control Team

Ward staff or the laboratory should inform the Infection Control Team (ICT) regarding a possible outbreak.

ICT must visit the ward/s and the kitchen (in suspected food poising) and laboratory to make direct inquiries. Collect epidemiological data regarding the onset of diarrhoea, whether one or more wards were affected, common food eaten by infected patients and dietary history.

Specimens of stools and / or vomitus and remnants of suspected food should be sent to the microbiology laboratory.

Inform Public Health Inspector

Inform PHI of the hospital. In hospitals where PHI not available MOH could be informed

Take immediate control measures

- Isolate the patients

  Patients should be isolated in an isolation room / ward or diarrhoea unit or cohort isolated in a cubicle at the end of the ward, near the toilet (preferably separate) or transferred to IDH.
- Discharge other patients early if clinically possible.
- Do not transfer patients or staff to other units.
- Closure of ward to new admissions may be necessary in major outbreak.
- These patients should be attended by specified nurse/s. They should not attend on other patients.

- Staff should strictly adhere to standard precautions and contact precautions (refer Chapters 3 and 4). Special attention should be paid to handwashing. Wear gloves whenever touching the patient or excreta.
- Adequate supply of running water, soap and single use towels must be ensured to facilitate handwashing.
- Clean ward/room more frequently especially the toilets, door knobs, taps, flush handle etc.
- Used bed pans, urinals, vomit bowls etc. should be first emptied into the toilet bowl and then disinfect with phenolic disinfectant (Lysol) or washed in bed pan washer if available.
- Disinfect spills of secretions/ excretions with Lysol.
- Ensure rational use of antibiotics. Use only when indicated, in consultation with the Microbiologist.
- Symptomatic staff members should be given leave or should refrain from caring for high risk patients. They are allowed to return to work after a 48 hours symptom free period.
- Educate the staff and patients regarding drinking boiled cooled water, eating only properly cooked food, keeping food and water covered, washing hands before eating and after using the toilet. Food should be eaten only in the dining area.

10.4.2. Suspected food poisoning

In addition to the control measures in 10.4.1

- Kitchen staff should be questioned and observed on food hygiene, personal hygiene, cooking practices, storage of raw food and cooked food, cleaning of cutting boards and knives etc.
- Suspected food items should be sent to the public health laboratory for microbiological investigation.
- Temporarily stop salads and other uncooked food preparations in the kitchen.
- Food handlers should be screened. Question regarding symptoms and send samples of faeces to the laboratory for investigation, if necessary. Infected

catering staff should not handle food until 3 consecutive faecal samples are negative.

- Ensure hygienic transport of food from kitchen to wards.
- Food processing units in the wards must be observed and proper food hygiene instructions should be given. If babies and neonates are affected preparation of bottle feeds and cereals should be observed.
- Bacteriological testing of water samples and chlorination of water sources may be necessary

10.4.3. Antibiotic associated diarrhoea

In addition to the control measures in 10.4.1

- Spores survive well in environment, floors, bedpans and hands of staff. Meticulous cleaning of environment and hand washing are important.
- Use 2% glutaraldehyde or peracetic acid for disinfection of heat labile instruments such as colonoscopies (refer 8.5)

10.5 MANAGEMENT OF AN OUTBREAK OF SURGICAL SITE INFECTION (SSI)

DEFINITION OF SURGICAL SITE INFECTION

Infection in the surgical site that occurs within 30 days of surgical procedure or within one year if there is an implant or foreign body

10.5.1 Surgical site infection

Identification of SSI is by the presence of clinical evidence of inflammation and/or presence of microbiological evidence.

Clinical evidence includes local signs of inflammation, purulent discharge from the surgical site and systemic signs like fever. Once SSI is suspected clinically, microbiological investigations should be carried out

- Ideal sample is aspirated pus.
- From surface wounds, two wound swabs should be taken from depth and edge of the wound, after cleaning the surface with sterile normal saline.

Microbiological evidence includes the presence of pus cells and organisms in the direct smear and / or a positive culture.

10.5.2 Management an of outbreak

Inform Infection Control Team

Ward staff or the laboratory should inform the Infection Control Team (ICT) regarding a possible outbreak.

Take immediate control measures

- Isolate the patients in a separate isolation ward / room. If this is not possible, cohort isolation with barrier nursing is an alternative.
- Antibiotics can be given depending on the clinical situation and the sensitivity pattern of the isolate.

- Review the current environmental cleaning, disinfection and sterilization practices. Strengthen if necessary. Organize supervision and audit.

Source identification

- Source could be patients own flora (commonest source), surgical team, operating theatre/ ward equipment and environment, ward staff and other patients in the ward.
- Epidemiological studies should be done to determine the nature of the outbreak. There are several clinical indicators and supporting evidence to postulate a likely source of SSI and depending on those staff screening and collection of environmental samples from the operating theatre or ward need to be done.
- Microbiological typing of the isolate if possible is important in identifying the source

10.5.3. Guidelines for wound dressing

- Preferably, one nurse should be allocated for these patients.
- Strictly adhere to standard precautions (Refer chapter 3) especially to proper handwashing (Refer chapter 5). Appoint a member of staff to supervise procedures.
- *Pay special attention to preparation, strength and storage of disinfectants and antiseptics.*
- All soaked dressings must be changed immediately. All discharging wounds must be covered adequately
- Wound dressing should be done in the same place where the patient is isolated.
- If all the dressings are done in a common dressing room, attend to these patients last. Preferably leave ten minutes gap between each patient for infected skin scales to settle down.
- Maintain strict aseptic techniques with contact precautions (refer chapter 4).
- Wear single use clean gloves to dress the wounds of each patient. Wear impermeable plastic aprons for large oozing wounds or if splashes are expected

- Dressing trolley top should be wiped with 70% alcohol at the beginning. (Disinfection between patients is not necessary).
- Use a separate dressing packet for each patient.
- Using forceps, remove soiled dressing and dispose in to a yellow bag immediately. (A yellow bag to dispose of waste should be hung by the trolley or kept in the near vicinity.)
- Do not leave the wound opened for a long time in order to reduce air borne contamination.
- Wash hands in between each dressing. Alcohol rub can be used if available.

10.6 MANAGEMENT OF AN OUTBREAK OF CHICKENPOX (VARICELLA ZOSTER)

Chickenpox is a highly infectious disease. An outbreak of chickenpox can be defined as two or more cases appearing within a week. An outbreak of chickenpox can occur among patients in a healthcare institution or among healthcare workers. The aim of management is to prevent infection in susceptible patients and healthcare workers

Modes of transmission

- Airborne infection by respiratory secretions and vesicle fluid
- Direct contact with vesicle fluid
- Indirect spread from articles freshly soiled with vesicle fluid or respiratory secretions of the patients

Incubation period

The incubation period ranges from 10-21 days, usually 14-16 days.

Period of communicability

- Between 2 days before and 5 days after the onset of rash (or until the lesions are crusted).
- The patient should be isolated, for this period or preferably discharged home if the condition of the patient is not serious or transferred to IDH

Non-immune contacts including healthcare workers

- Susceptible contacts should be considered infectious between 8 and 21 days following exposure.
- A healthcare worker developing the disease should stay away from work until such a person is non-infectious.

10.6.1 Management of chickenpox patients during an outbreak

- Discharge the patient home or send the patient to Infectious Disease Hospital (IDH), if possible.
- Source Isolation of infected patients.
  - Patients should be isolated in a properly ventilated isolation unit with negative pressure.
  - If this facility is not available, isolate the patient in a side room with door closed and windows opened.
  - Use standard precautions, droplet precautions and contact precaution (Refer chapter 3 and 4).
  - Patients should be nursed by staff known to be immune, ideally by antibody testing or else by history.
  - Barrier nursing, handwashing and disinfection of fomites and instruments are important as infection can be spread by contact with vesicle fluid and respiratory secretions.
  - Mattresses and pillows should have impermeable covers.
  - After discharging the patient, furniture, fittings, horizontal surfaces and all medical equipment should be wiped with 0.1% hypochlorite.

10.6.2 Management of contacts

The contacts of the patient should be questioned regarding a past history of chickenpox or vaccination. People with a past history of chickenpox or vaccination are considered immune and no further action is required.

Those with no past history of infection or vaccination should be considered as non immune. If facilities are available, check for antibodies against varicella zoster virus IgG antibodies. All IgG negative individuals are considered susceptible.

It has to be ascertained whether there has been a significant exposure to chickenpox. Action is only needed when susceptible patients / healthcare workers have had a *significant exposure.*

A significant exposure is defined as

- Exposure of a susceptible individual to a patient with chickenpox from 2 days before to 5 days after the onset of rash.
- Closeness and duration of contact susceptible individual to a patient, such as contact in the same room for a significant period of time (15 minutes or more) or face to face contact, for example, while having a conversation.

Non immune staff

- Should refrain from working in high risk areas (specially the units with immunocompromised, obstetric or neonatal patients) between 8 – 21 days after exposure as they are infectious during this period if they are incubating the infection.

Non immune patients

- Discharge the patients who are fit to be discharged. Ask them to inform the ward if they get blisters and manage accordingly

10.6.3 Post-exposure prophylaxis

Aciclovir

Prophylactic aciclovir is given in a dose of 40 mg / Kg / day in 4 divided doses given for 7 days starting from the 7 – 9th day after the exposure to the index case. Estimated efficacy is about 80 – 85%.

Varicella vaccine

The vaccine can be given to any vaccine candidate.

- Children > 1 year old, adolescents and adults
- Non-pregnant women of child bearing age

Timing

The vaccine is best given within 3 days of exposure but can be given up to 5 days after exposure

Dosage and administration

- Children (1 – 13 years of age) – 0.5 ml subcutaneously (single dose)
- Adults (13 years and older) – 0.5 ml subcutaneously (2 doses given 4 - 6 weeks apart ; a single dose vaccine has been recently introduced)

A single dose gives 70% protection. The estimated efficacy after both the doses is 70% to 90%. Protection occurs 14 days after the first dose.

Varicella Zoster Immunoglobulin (VZIG)

Patients and staff at high risk of developing severe infection (see below), should ideally be given VZIG within 96 hours of exposure. This will not always prevent the infection but will attenuate infection. The efficacy is about 90 %.

Indications for VZIG

- Immunocompromised patient including haematological malignancies
- Pregnant patients or staff
- Neonates

As efficacy is not 100% in all 3 modes of prophylaxis, oral aciclovir therapy should be started in adult patients, within 24 hours of onset of rash

10.6.4 Treatment of Chickenpox

- Adults who present within 24 hours of onset of rash should be considered for oral aciclovir therapy.
- The dose is 800mg, 5 times daily for 7 days

10.6.5 Herpes zoster (shingles)

- Non immune individuals may develop chickenpox if exposed to patients with shingles.
- Virus is present in vesicle fluid until the lesions are dried. Lesions should be kept covered.
- Respiratory secretions are not usually a source except, in oro-facial (trigeminal) disease.
- Patients with shingles, especially of trigeminal distribution, should be source isolated and nursed by staff immune to chickenpox.

10.7 INFECTION CONTROL OF SCABIES

Two clinical types of scabies

- Conventional scabies
- Crusting (Norwegian) scabies

Transmission

- by direct contact with infested skin and sexual contact.
- by bedclothes

Incubation period

- two to six weeks (with out previous exposure)
- one to four days (with previous exposure).

10.7.1. Management of an outbreak of scabies

Treatment of patients

Agent	**Method**
0.5% Malathion solution 5% Permethrin cream	Single application (two applications one week apart if needed) Washed off after 18 - 24 hours
6 -10% precipated sulpha in petroleum jelly	Daily for 3 days
Benzyl benzoate (Only for adults)	Three applications on consecutive days. Daily baths and advise to wear washed boiled cloths

Close supervision of treatment including bathing is necessary.

For about 5% of people a second treatment is needed, if eggs survive.

Conventional scabies

- Patient should be kept in contact isolation, with careful gloving and hand washing, for 24 hours after commencement of effective treatment.
- Prevent skin to skin contact for 8 hours after application of scabicides.
- Room should be cleaned as usual.
- Launder the clothes used by the patient 48 hours prior to treatment, should be boiled.

Crusting scabies

- Increased risk of transmission due to large mite population.
- Gloves, long sleeved gowns with the wrist area covered and shoe covers should be worn when attending to patient or his clothes.
- Hands should be washed when gloves are removed.
- Enhanced barrier protection with insecticide spray to household items.
- Furniture containing textiles should be removed and replaced with vinyl furniture.
- Laundry workers should wear gowns and gloves.
- All toys and shoes should be sealed in polythene for 10 days to reduce the mite population.
- Precaution should be continued until skin scrapings have been negative for three consecutive days.
- Terminal cleaning of the ward / room involves thorough vacuuming after insecticide spraying or fogging.
- Hospital staff, household members and close contacts who may have had contact with the patient should be traced and treated if infested.
- All infested persons should be treated at the same time if possible.

10.7.2 Scabies in HIV infected patients

- *S. scabiei* proliferates to an alarming degree in HIV infected patients
  These patients should be examined for scabetic burrows.

CHAPTER 11

HOSPITAL

WASTE MANAGEMENT

CHAPTER 11

HOSPITAL WASTE MANAGEMENT

INTRODUCTION

Hazardous hospital waste are unique forms of solid and liquid waste generated in the diagnosis, treatment, and research of human and animal disease. Hazardous waste, when ineffectively managed, may compromise the quality of patient care. It presents occupational health risks to those who generate, handle, package, store, transport, treat and dispose of them. It also presents environmental and public health risks through inappropriate treatment and/or disposal which may contribute to environmental pollution and the spread of infectious diseases including AIDS, hepatitis, tuberculosis, cholera and typhoid.

Hospitals must realize that an effective program of hospital waste management is an integral part of a hospital's infection control program, and therefore critically linked to the quality of patient care and health and safety of the worker. Additionally, when properly implemented and enforced, effective waste management can have distinct economic benefits, such as cost savings linked to waste reduction and recycling of waste.

In most hospitals waste disposal methods are unsatisfactory as the staff involved in waste management do not follow definite guidelines.

11.1. DEFINITIONS OF HOSPITAL WASTE

Hospital waste may be classified into two types:

A. **Hazardous waste**. Hospital waste considered hazardous due to actual or presumed biological and/or chemical contamination.

B. **General or non-hazardous waste** not contaminated with blood, body fluids, or other infectious agents or materials eg. paper, fabric, glass, food residues and containers.

11.1.1 Hazardous waste.

The basic categories of hazardous hospital waste include: infectious, pathological, sharps, chemical, pharmaceutical and radioactive waste.

a. Infectious Waste

Infectious waste includes blood and blood products, items contaminated with blood, serum or plasma, cultures and stocks of infectious agents from diagnostic and research laboratories and items contaminated with such agents, waste from highly infectious patients (to include food residues), expired vaccines and other contaminated materials infected with human pathogens.

b. Pathological Waste

Pathological waste includes human tissues, organs, body parts, fetuses, and other similar waste from surgery, biopsies, autopsies; animal carcasses, organs, and tissues infected with human pathogens.

c. Sharps

Sharps include needles, syringes, scalpel blades, razors, infusion sets, contaminated broken glass, blood tubes and other similar materials.

d. Chemical Waste

Chemical waste includes solid, liquid or gaseous chemicals such as solvents, reagents, film developer (ethylene oxide) and other chemicals that may be toxic, corrosive, flammable, explosive, or carcinogenic.

e. Pharmaceutical Waste

Pharmaceutical waste includes outdated medications of all kinds, as well as residues of drugs used in chemotherapy which may be cytotoxic, genotoxic, mutagenic, teratogenic, or carcionogenic.

f. Radioactive Waste

Radioactive waste includes any solid, liquid, or pathological waste contaminated with radioactive isotopes of any kind.

11.2 HAZARDOUS WASTE MANAGEMENT

11.2.1. Waste minimization / separation

Waste minimization is a process which reduces the amount of waste categorized as hazardous. This reduces waste handling and cost. Separation is most effective when done at the point of generation of waste. eg. after use a syringe becomes hazardous waste but its original package does not. Therefore the packaging can be placed into a non-hazardous waste container but the needle and syringe should be placed in a sharps bin. This process minimizes the quantity of waste labeled as hazardous.

11.2.2. Waste identification

The use of colour coding of hazardous waste containers is useful in identifying the different types of waste. The World Health Organization recommends the following colour coding.

Black - non infectious / non hazardous

Yellow – infectious waste

Sharp bin

11.2.3 Waste handling

Waste handling within the hospital includes collection, transport and storage. waste should be collected from each ward /unit on a regular schedule by an individual with a cart dedicated to waste collection. The waste handler should wear a protective gown or apron and heavy duty gloves. The waste cart should be transported through the hospital using a specifically designated route to the storage area. The waste collected should be kept in the storage area for not more than 48 hours until transported for treatment or disposal.

Sharps

For handling of sharps refer 3.7.1.

All used syringes, needles and broken glassware should be collected into a ‘sharp’ bin. This should be made of leak proof and puncture proof material. If standard sharp bins are not available, an improvised ‘sharp’ bin made of thick cardboard could be

used. The bin should have an opening on top, sufficient only to dispose the used syringes and needles conveniently (figure 4).

After the bin is ¾ full and transport to incinerator for burning. If an incinerator is not available, burn in a drum incinerator (figure 5) or deep pit (figure 6). The residue should be buried at sufficient depth (> 1 m). The pit should be preferably lined with impervious material eg. clay or concrete lined.

Figure 4. Sharps bin

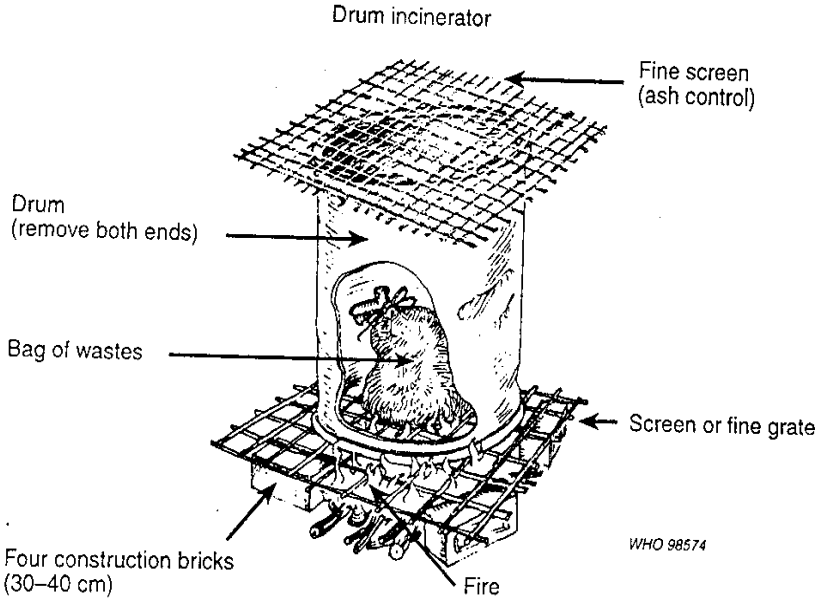


Figure 5. Drum incinerator

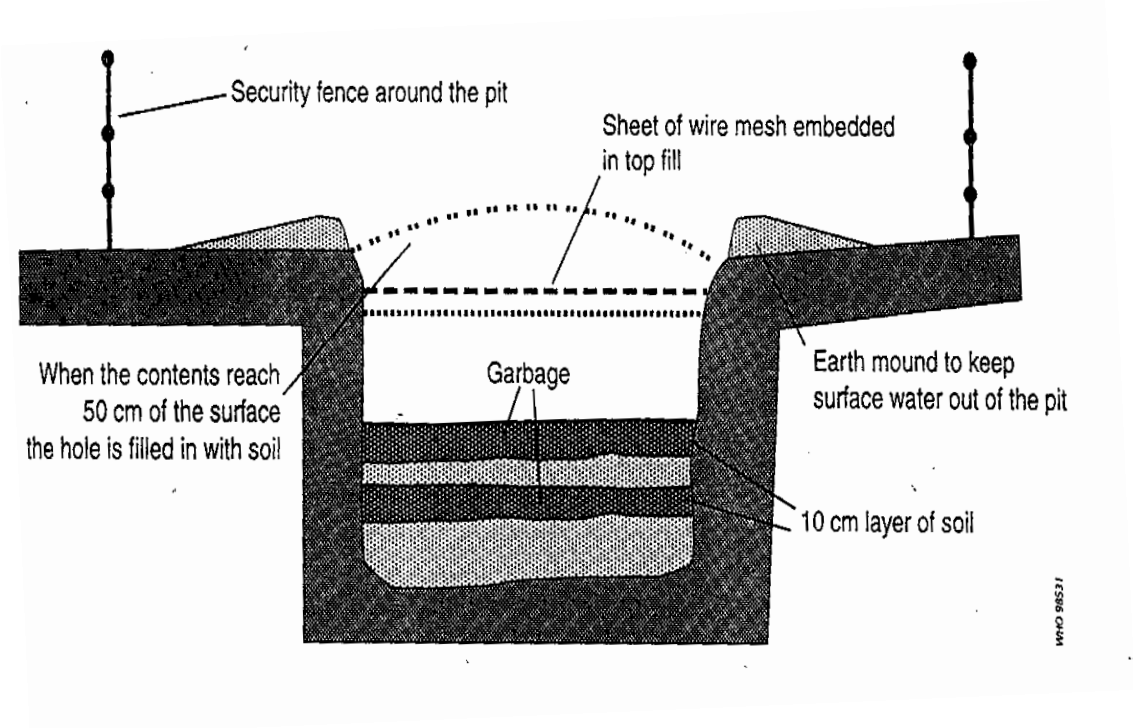


Figure 6. Burial pit

11.2.4. Waste treatment and disposal

Non-hazardous waste

Place in black polythene bags of approximately 200 μm gauge. Dispose to a common garbage site / bin to be collected by the local authorities or bury in a common garbage pit.

Hazardous waste

- **Pathological Waste**

  All anatomical waste from the theatre should be collected in a yellow bag and transported to the closest crematorium for incineration. If there is a delay, store at 1-5 ^{0}C in the mortuary. Alternatively, bury at sufficient depth (> 1 m) in the hospital premises in a secure place more than 100m away from any underground water sources eg wells.

  Placentae collected from the labour room should be buried or incinerated.

  Contaminated dressings, cotton swabs and drip sets should be collected in yellow bags, sealed with appropriate adhesive tape and incinerated. If an incinerator is not available, burn in a concrete lined pit. If facilities are available autoclaving and shredding can be done

- **Effluents**

  Untreated effluent should be discharged through a sanitary sewerage system to a treatment plant or closed drainage system if this facility is available. There should be a dedicated sink/commode for this purpose. Health care worker should wear personal protective equipment and should avoid splashing and aerosol formation.

  If there is no closed drainage system, decontaminate with an equal volume of 1% hypochlorite solution or if tuberculosis is suspected 5% Lysol solution overnight, before discharging into the drainage system.

Radio active effluents of patients on radiotherapy should be discharged into a septic tank, after radioactivity has decayed to back-ground level in a retention tank.

- **Radioactive Waste**

  Radio active waste is collected in appropriate containers & stored as required by the appropriate nuclear authority for time periods suitable for complete radio active decay. Thereafter, dispose as non-hazardous waste.

- **Pharmaceutical waste**

  Pharmaceutical waste should not be burnt or buried. It should be returned to the Medical Supplies Division for proper disposal. If this is not possible "inertisation" technique should be used. That is to mix pharmaceutical waste with cement & lime before burying in a concrete lined pit.

- **Chemical Waste**

  Large quantities of these could be returned to the supplier. If not seek advise from Central Environmental Authority. *Waste with high levels of cadmium and mercury should never be incinerated.*

- **Laboratory Waste**

  Refer 11.3

11.2.5. Security

Each hospital should enforce rules and measures necessary to curtail & prevent scavenging of waste. Limiting public access to hospital areas where waste is separated, collected, transported & stored prior to treatment & disposal should be a priority. Measures also should be taken to curtail attacks by scavenging animals & birds.

11.2.6. Training

Training of health care workers must be provided when

1. New employees begin work.
2. Existing employees are assigned new work responsibilities
3. Policy changes are made by the administration.

It is important to educate workers on the risks associated with hazardous hospital waste, the value of immunization for hepatitis B & the importance of using the personal protective equipment provided.

11.2.7. Health and safety

An appropriate health and safety programmme should be provided to include proper training, issuing of personal protective equipment (gloves and gowns) and medical surveillance. (immunization, post-exposure prophylaxis)

11.2.8. Emergency planning

The hospital management should be geared for handling unexpected situations such as

1. Accidental spills
2. Equipment failures
3. Delays or interruptions in waste collection, transport or treatment services
4. Any other incident that require rapid action.

11.3 DISPOSAL OF INFECTIOUS WASTE IN THE LABORATORY

Non-infectious waste

All waste not contaminated with infective material and disposable items which are not contaminated with blood and body fluids eg food, paper waste, polythene wrappers, empty plastic and glass bottles.

Infectious waste

- Clinical specimens – blood/serum, pus, sputum, urine body fluids and stools
- Contaminated items such as,
    - specimen containers/glassware
    - used syringes and needles
    - soiled dressings/ cotton wool
    - used bacteriological culture media etc.

Infectious and noninfectious waste should be collected and disposed separately. Infectious waste should be rendered non infectious prior to disposal. Every laboratory should have a dedicated autoclave for decontamination.

11.3.1. Disposal of infectious waste

Microbiology specimens

Microbiology specimens should be rendered non-infectious by autoclaving or incineration. If these facilities are not available:

- **Pus, sputum and faeces** may be immersed in 5% Lysol overnight. Once they are rendered non-infectious these specimens could be disposed via the general drainage system ie. poured into a sink. Alternatively these specimens may be burned in an open pit followed by covering with a layer of soil.
- **Blood, serum or body fluids** can be poured into a sink connected to a closed drainage system or these specimens can be rendered non-infectious by immersing in 1% hypochlorite solution overnight before disposal or washing for reuse.

Untreated samples should not be poured into a sink or a drain unless it drains into a closed drainage system.

Histology Specimen / Anatomical waste

These should be disposed by incineration or by burial. Burial should be done under supervision in a deep pit.

Specimen containers

Disposable containers should be rendered non infectious by autoclaving or incineration. Once they are safe to handle, they maybe disposed together with non-infectious waste into a common garbage dump. Reusable containers should autoclaved and washed.

Laboratory Glassware

Reusable glassware (eg. tubes, pipettes, universal and bijou bottles) contaminated with infective material should be rendered non-infectious by autoclaving. If an autoclave is not available, they may be boiled for 20 minutes or immersed overnight in 1% hypochlorite. Once rendered non-infectious they may be washed using a brush and a detergent in order to remove all organic material.

Bacteriological media

All used bacteriological media should be rendered non infectious by autoclaving. After autoclaving they may be disposed via the general drainage system preferably with hot water to prevent clogging of pipe lines.

If an autoclave is not available media be immersed in 5 % Lysol solution overnight and then collected in yellow bags.

Sharps

Refer 11.2.3.

CHAPTER 12

INFECTION CONTROL

IN

HEALTHCARE WORKERS

CHAPTER 12

INFECTION CONTROL IN HEALTHCARE WORKERS

12.1. IMMUNIZATION PROGRAMME

Hepatitis B vaccination

- All HCW who perform tasks involving contact with blood, blood-contaminated body fluids, other body fluids or sharps should be vaccinated against HBV.
- Their anti-HBs levels should be tested 1-2 months after completion of the 3 dose vaccination series.
- HCW who do not respond to the primary vaccine series (i.e., anti-HBs <10mIU/ml) should complete a second 3 dose vaccine series.
- Revaccinated HCW should be tested for adequate levels of anti-HBs, 1-2 months after completion of the second 3 dose vaccination series.
- In HCW who develop adequate levels of anti-HBs, booster doses and periodic testing of anti-HBs levels are not recommended.
- Those who do not respond to two courses of HB vaccine {primary non responders) need counselling and education.
- HBsAg may be tested (to detect carrier status)under certain circumstances

Other useful vaccines

Rubella vaccine

Chickenpox (VZV) vaccine

12.2. HEALTH AND SAFETY EDUCATION AND COUNSELLING

Pre-employment and in-service health education of HCW on occupational health hazards such as HIV, HBV and TB, should be conducted on a regular basis by the infection control / health education unit.

12.3. MANAGEMENT OF A HCW POTENTIALLY EXPOSED TO HBV, HCV OR HIV

The risk of infection after percutaneous injury is approximately

Hepatitis B	30%
Hepatitis C	3%
HIV	0.3%

a. Provide immediate care to the exposure site

- Allow the wound to bleed
- Wash wound and skin with soap and water
- Flush mucous membranes with water
- Irrigate eyes with clean water

b. Report all exposures to Infection Control Team through ward sister

c. Determine the risk associated with exposure

Factors to be considered in assessing exposures

Type of exposure

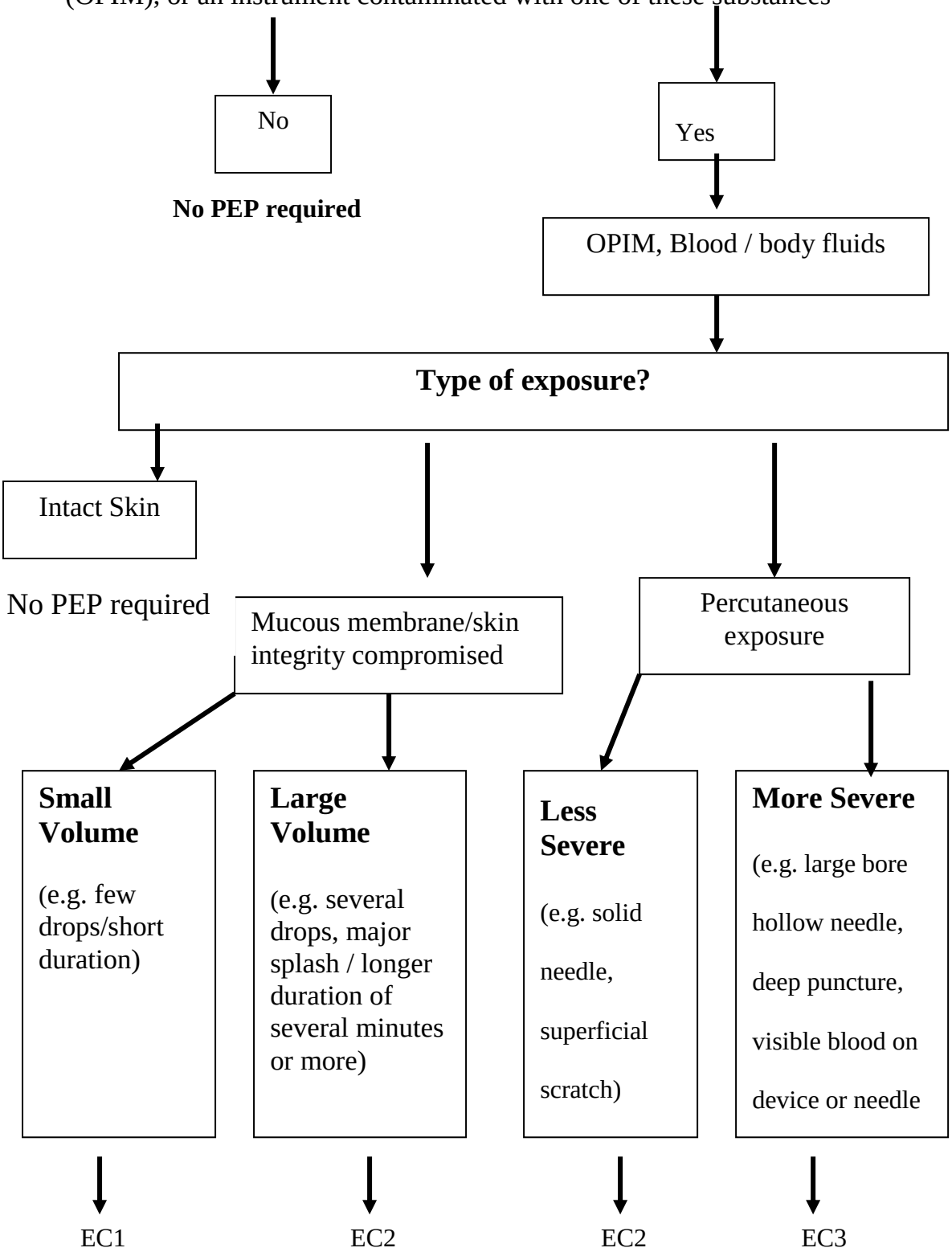
- Percutaneous injury
- Mucous membrane exposure
- Non-intact skin exposure

Type and amount of fluid / tissue

- Blood
- Fluids containing blood
- Other potentially infectious material (OPIM) (cerebrospinal, synovial, pleural, peritoneal, pericardial, and amniotic fluids, semen, vaginal secretions)

For HIV, determine the Exposure Code according to the flow chart below

EXPOSURE CODE (EC)



d. Evaluate exposure source

Evaluation of exposure sources

Test **known sources** for HBsAg, anti-HCV, and HIV antibody

- Consider using a rapid HIV-antibody test
- If the source person is not infected with bloodborne pathogens, base line testing or further follow-up of the exposed person is not necessary.

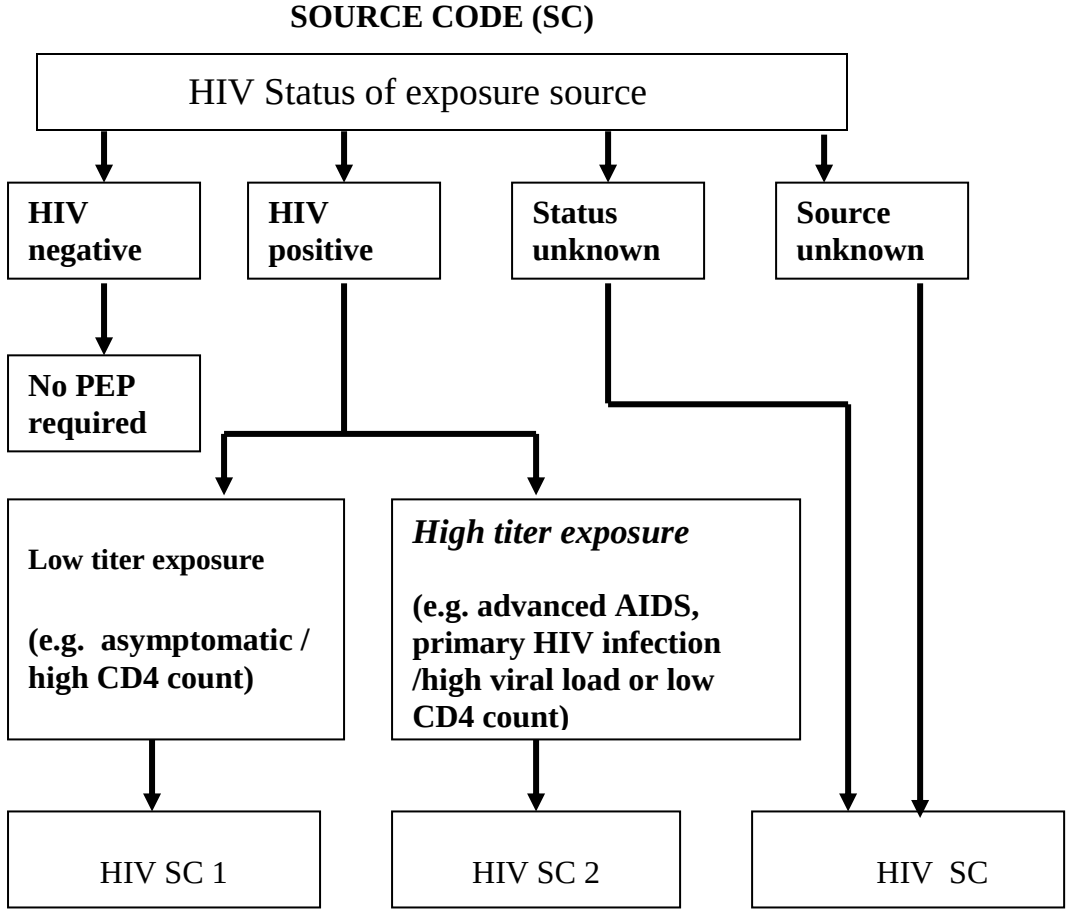
For sources whose **infection status remains unknown** (e.g., the source person refuses testing)

- Consider medical diagnoses, clinical symptoms, and history of risk behaviours

For **unknown sources**, evaluate the likelihood of exposure to a source at high risk of infection

- Consider likelihood of bloodborne pathogen infection among patients in the exposure setting

For HIV determine the exposure source code according to the flow chart below



e. Evaluate the exposed person

- Assess immune status of HBV infection (i.e., by history of hepatitis vaccination and vaccine response)
- Assess HIV status with HIV antibody testing.

f. Give post-exposure prophylaxis for exposures posing risk of infection

Post-exposure management HCW potentially exposed to HBV

Vaccination and antibody response status of exposed person	**Treatment**		
	Source ***HBsAg positive***	Source **HBsAg negative**	Source **Unknown or not available for testing**
Unvaccinated	HBIG × 1 and initiate HB vaccine series	Initiate HB vaccine series	Initiate HB vaccine series
Previously vaccinated **Known responder**	No treatment	No treatment	No treatment
Previously vaccinated **Known nonresponder**	*****HBIG × 1 and initiate HB revaccination or HBIG × 2	No treatment	If known high risk source, treat as if source was HBsAg positive
Previously vaccinated **Antibody response unknown**	Test exposed person for anti-HBs 1. If adequate no treatment is necessary 2. If inadequate administer HBIG × 1 and vaccine booster	No treatment	Test exposed person for anti-HBs 1. If adequate no treatment is necessary 2. If inadequate administer vaccine booster and recheck titer in 1-2 months

Hepatitis B immunoglobulin dose is 0.06ml/kg intramuscularly

*****The option of giving one dose of HBIG and reinitiating the vaccine series is preferred for non-responders who have not completed a second 3 dose vaccine series. For persons who completed a second vaccine series but failed to respond, two doses of HBIG are preferred.

Persons who have been previously been infected with HBV are immune to re-infection and do not require post-exposure prophylaxis.

- A responder is a person with adequate levels of serum antibody to HBsAg (i. e., anti-HBs ≥10 IU/ml).
- A non-responder is a person with inadequate response to vaccination (i. e., anti-HBs <10 IU/ml)

Post-exposure management of HCW potentially exposed to HIV

Determination of PEP Recommendation

EC	SC	PEP Recommendation
1	1	PEP may not be warranted
1	2	Consider basic regimen (negligible risk)
2	1	Recommend basic regimen (most exposures are in this category)
2	2	Recommend expanded regimen
3	1 or 2	Recommend expanded regimen
2/3	Unknown	If setting suggests a possible risk (epidemiological risk factors) and EC is 2 or 3, consider basic regimen

HIV Post-exposure Prophylaxis (PEP) Regimens

- **Basic regimen**

Zidovudine	200mg three times daily or 300mg twice daily
Lamivudine	150mg twice daily

- **Expanded regimen**

Zidovudine	200mg three times daily or 300mg twice daily
Lamivudine	150mg twice daily
Indinavir	800mg three times daily
	or
Nelfinavir	750mg three times daily

Initiate PEP as soon as possible, preferably within hours of exposure.
Administer PEP for 4 weeks if tolerated
Monitor for drug toxicity for at least 2 weeks

For further information contact National STD/AIDS Control Programme (NSACP) Telephone 011 – 2667163

g. Report exposure

- Report all exposures to Infection Control Team through ward sister

- Report all needle-stick/ sharp injuries to National STD/AIDS Control Programme (NSACP) using the Exposure Report form of General Circular Letter No: 36/2001 of Ministry of Health (page 174)

EXPOSURE REPORT

1. Date: __ / __ / 200__

2. Institution : _____
_____

3. Name / Designation of HCW :_____

4. Date / Time of exposure: __ / __ /200__ , ___ / ___ am/pm

5. Details of the procedure
Laboratory/Theatre/Ward/ Clinic/ Other _____

Sharp instrument/ Needle – Solid/ hollow bore_____

6. Details of the exposure
Blood/Bloody fluids/ OPIM♣ _____

Small / Large volume _____

Percutaneous/Mucus membrane/ Abraded skin /Intact skin _____

7. Details of the exposure source
Material, HIV / other blood borne infections _____

If HIV positive- stage of the disease /CD4 / viral load _____

History of anti retroviral therapy _____

8. Management of post exposure

EC ___ / HIV SC ___ / Unknown
PEP recommended : Yes/ No

9. HIV testing after 6 months on HCW

Positive / Negative

Signature _____

Name / Designation of the Counsellor : _____

♣ Other potentially infectious material

Please send a copy of this report to Director / NSACP

h. Perform follow-up testing and provide post-exposure counselling

For HBV exposures

- Perform follow-up anti-HBs testing in persons who receive HB vaccine by testing for anti-HBs, 1-2 months after **completing the course of vaccination**.

For HIV exposures

- Perform HIV-antibody testing for at least 6 months post-exposure (e.g., at baseline, 6 weeks, 3 months, and 6 months)
- Perform HIV antibody testing if illness compatible with an acute retroviral syndrome occurs
- Advise exposed person to use precautions to prevent secondary transmission during the follow-up period

12.4. INFECTION CONTROL IN OTHER INFECTIONS

12.4.1 Prevention and post-exposure management of other infections

Infectious agent	Prevention	Post-exposure management
HBV HCV HIV	Standard precautions HBV vaccination	Refer 12.3.1
Conjunctivitis	Hand washing, gloves, disinfection of instruments	
Diphtheria	Droplet precautions (for patients with pharyngeal symptoms) Contact precautions (for patients with cutaneous lesions)	Benzathine penicillin IM 1.2 mu single dose or Erythromycin oral 1g daily for 7 days. (Efficacy of antimicrobial prophylaxis not proven) A dose of adult tetanus toxoid / diphtheria (aTd) vaccine if HCW has not been vaccinated within previous 5 years
Gastro-intestinal infections, acute	Standard and contact precautions	
Hepatitis A	Standard and contact precautions	

Meningococcal disease	Droplet precautions	For HCWs who had intensive, unprotected contact (i.e. without wearing mask) with infected patients (e.g. mouth to mouth resuscitation, endotracheal intubation, endotracheal tube management or close examination of the oropharynx) *Ciprofloxacin 500mg oral single dose or Ceftriaxone 250mg IM single dose or * Rifampicin 600mg orally every 12 hours for 2 days (* Not recommended for pregnant women)
Pertussis	Droplet precautions	Erythromycin 500mg orally four times daily for 7 – 14 days (Efficacy not well documented)
Rabies	Standard precautions	Refer 12.4.3.
Tuberculosis	Airborne precautions	Refer 12.4.2.
Varicella	Airborne and contact precautions VZV vaccination	Refer 10.6
Viral respiratory infections, RSV etc	Droplet precautions	

For definitions of standard, contact, droplet and airborne precautions refer chapter 3 and 4

12.4.2 Infection Control in Tuberculosis

General measures

- Patients with suspected /confirmed respiratory tuberculosis, regardless of the sputum status, should not be admitted to an open ward containing immuno-compromised patients, transplant or oncology patients until pronounced non-infectious by the physician in charge, preferably in consultation with the Microbiologist.
- The Infection Control Team should be informed. Staff and visitors who are non immune should be warned of the risk.
- Duration of infection control precautions in pulmonary TB should be for two weeks after start of effective antimicrobial treatment and sputum microscopy should be negative for AFB. In immunosuppressed patients duration of infection control should be till sputum microscopy is negative for AFB.

Infection control precautions

- Isolation
    - Isolate in a single room with negative air flow ventilation in relation to the surrounding areas. As there are no negative pressure rooms available in Sri Lankan hospitals, a room with 2 strong exhaust fans could be used instead. Alternatively, a single room with good ventilation may be used.
    - Room with a washbasin and preferably, with an attached toilet
    - The door must be kept closed at all times. Preferably self closing doors.
    - Ensure adequate supply of handwash antiseptics and single use towels.
    - Ensure a clinical waste bag is kept inside the room.
    - A sputum mug containing 5% Phenol (Lysol) for sputum should be provided. This is ideally autoclaved before disposal. If facilities are not available for autoclaving they should be disposed by burning or deep burying after disinfection using 5% phenol or 1% hypochorite for 30 min. For stainless steel sputum cups after disinfection, washed with GPD.
    - Visitors should be restricted, as far as possible.
    - Babies of sputum positive mothers need not be separated from the mothers and breast feeding should be continued with baby on prophylactic INAH therapy, with mother wearing a mask.

  - Contact with staff should be kept to a reasonable minimum without compromising patient care.

- Protective clothing
  - Gloves are not usually necessary, but should be worn for contact with respiratory secretions or contaminated articles.
  - Plastic aprons and gowns should be worn for contact with patients and their environment to avoid contamination of clothing.
  - Ordinary surgical masks do not provide the required level of protection. If the Particulate Filter Respirator (PFR) masks are available, they can be used. Surgical masks could be given to patients with uncontrolled cough to reduce aerosol spread. Wearing a mask for the staff is recommended when direct exposure to respiratory secretions is unavoidable. eg: during physiotherapy or bronchoscopy. Masks should be close fitting.
    Wearing a mask is not a substitute for good infection control.

- Hand hygiene
  - Hands must be washed after touching the patient or potentially contaminated articles and before taking care of another patient.
  - Wash hands thoroughly with an antiseptic and dry with a single use towel.

- Equipment
  - Ideally, Disposable respiratory equipment and accessories should be used.
  - Where this is not possible, they should be thoroughly cleaned and disinfected or sterilized before reuse. Refer 6.6

- Movements
  - Limit movement within the hospital, eg to X-ray department, to a minimum

- Contact tracing
  - Contact tracing is an integral part of the routine management of the patients with tuberculosis. The person responsible for local contact tracing should be named by the hospital authorities.

12.4.3. Infection control in Human Rabies

General measures

- Natural transmission of rabies from human to human has never been documented. A clinically suspected case of rabies could be admitted to a general medical or surgical ward.
- Panic situation among staff should be avoided when there is a patient in the ward with suspected rabies.

Infection control precautions

- HCW should wear gloves, masks, gowns and eye protection, if available, when coming into contact with the patient's saliva or any other body fluid, to avoid contamination of mucus membranes.
- Patient's clothing, bed linen and other personal items should be washed with soap water and boiled before reuse.
- Spillage of secretions or body fluids should be disinfected with freshly prepared 1% hypochlorite solution.
- Any equipment used on the patient (suckers, ventilator tubing etc.) should be disinfected. Refer 6.6

Post-exposure anti rabies therapy

- HCW does ***not*** need any post-exposure anti rabies therapy unless there is direct contamination of mucous membranes or open wounds with the patient's saliva or secretions, or they have been bitten or scratched by the patient while nursing.

Please contact the Department of Rabies, MRI for further details.
Telephone. 0112693532- 4, 0112698660

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