**Operational Waste Management, Health and Safety Manual for Health Care Facilities.**
**(For operation period of the health care facilities)**

Solomon Islands COVID-19 Emergency Response Project (P173933)

April 12, 2024

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**Annex I MHMS Infection Prevention and Control Guidelines (IPCG)**

## 1 Introduction

According to WHO[1], health workers working at health care facilities and laboratories are exposed to a complex variety of health and safety hazards every day, including:

- biological hazards, such as TB, Hepatitis, HIV/AIDS, SARS;
- chemical hazards, such as glutaraldehyde, ethylene oxide;
- physical hazards, such as noise, radiation, slips trips and falls;
- ergonomic hazards, such as heavy lifting;
- psychosocial hazards, such as shift work, violence, and stress;
- fire and explosion hazards, such as using oxygen, alcohol sanitizing gels; and
- electrical hazards, such as frayed electrical cords.

Due to these, health workers need protection from these workplace hazards when they enter their workplace. Unsafe working conditions contribute to health worker attrition in many countries due to work-related illness and injury and the resulting fear of health workers of occupational infection, including from HIV and Tuberculosis. Infections caused by accidental blood exposure are generally preventable if health workers use appropriate protective wear such as gloves and eye protection, spills of body fluids are cleaned up promptly, and biomedical waste is disposed of correctly. Protecting the occupational health of health workers is critical to having an adequate workforce of trained and healthy health personnel.

Health and safety issues of the community, including patients and visitors related to the health care facilities and laboratories, are similar to those issues exposed to the health care workers. Thus, it is important to recognize shared health and safety risks between health care staff and patients and identify opportunities to integrate patient and worker safety activities across departments and programs.

Without basic health and safety guidelines and the ability to implement them, health workers, patients, and visitors to health care facilities and laboratories are vulnerable to accidents and exposure to infectious diseases.

This Operational Manual is developed as the guidance for the healthcare workers of the Nila isolation unit under Solomon Islands COVID-19 Emergency Response Project (P173933) on the Healthcare Waste Management, Occupational Health and Safety, and the Infection Prevention and Control during operation period. Most of the relevant sections are extracted from the National level Infection Prevention and Control Guidelines (IPCG) (2020), and the Environmental and Social Management Framework (ESMF) of the project.

## 2 National Infection Prevention and Control Guidelines (IPCG), 2020

The National level Infection Prevention and Control Guidelines (IPCG) was enacted by the Ministry of Health and Medical Services (MHMS) in 2020 with the assistance from the World Health Organization (WHO). The national guidelines cover the best practices on the infection prevention and control including the health care waste management practices, and occupational health and safety in line with the GIIP and World Bank's ESF requirements. The subprojects under the project will follow the practices under the IPCG.

## 3 Hazardous and clinical waste management

Health care waste (HCW) includes all wastes generated in the delivery of health care services. WHO (1999a) estimates that 75-90% of the waste produced by the health care facilities originates from non-risk or general sources (e.g., janitorial, kitchens, administration) and is comparable to domestic waste. The remaining 10-

[1] https://www.who.int/occupational_health/topics/hcworkers/en/

25% of HCW are classified as hazardous and poses a variety of potential health risks. Categories of health care waste, as defined in WHO (1999a) are summarized in Table 1.

Exposure to hazardous healthcare waste can result in disease or injury. All individuals exposed to hazardous healthcare waste are potentially at risk, including those within healthcare establishments and those outside these sources. The main groups at risk are health staff (doctors, nurses, technicians, auxiliary and maintenance staff, janitors); patients, their relatives and visitors; workers at waste disposal sites including scavengers; and nearby communities.

Pathogens in infectious waste may enter the human body by a number of routes: through a puncture, abrasion, or cut in the skin; through the mucous membranes; by inhalation; or by ingestion. Sharps may not only cause cuts and punctures but also infect wounds if they are contaminated with pathogens. Sharp injuries are the most popular accidents in health facilities. Sharp injury is the main transmission way of several dangerous infectious diseases. Unless healthcare wastes are managed strictly, they easily cause pollution of the environment and health impacts.

Table 1: Health care waste characteristics and hazards profile

| **Classification** | **Characteristics/Associated Hazards** |
|---|---|
| Infectious | Comprises waste that is suspected of containing pathogens including laboratory cultures, surgery and autopsy waste from patients with infectious diseases, bodily wastes from patients in infectious disease wards, and miscellaneous waste such as disposable gloves, tubing, and towels generated during the treatment of infectious patients). Pathogens from infectious waste may enter the human body through puncture of skin cuts, mucous membranes, inhalation or ingestion. |
| Pathological | Consists of tissue, organs, body parts, blood and body fluids. Pathological wastes are considered a sub-category of infectious wastes and pose the same hazards. |
| Sharps | Describes items that could cause cuts or puncture wounds, including hypodermic needles, scalpel, and broken glass. Because sharps can not only cause cuts and punctures but also infect these wounds if they are contaminated with pathogens, this sub-category of infectious wastes is considered very hazardous. |
| Chemical | Consists of discarded solid, liquid and gaseous chemicals with toxic, corrosive, flammable, reactive, and genotoxic properties. Chemicals most commonly used in HCF include formaldehyde, photographic chemicals, heavy metals such as mercury from broken clinical equipment, solvents, organic and inorganic chemicals, and expired, used or spilt pharmaceuticals. Hazards from chemical and pharmaceutical waste include intoxication as a result of acute or chronic exposure from dermal contact, inhalation or ingestion and contact burns from corrosive or reactive chemicals. |
| Radioactive | Includes solid, liquid and gaseous materials contaminated with radio nuclides; produced as a result of procedures such as *in-vitro* analysis of body tissue and fluid, *in-vivo* organ imaging and various investigative and therapeutic practices. Because radioactive waste is genotoxic, health workers in handling active sources and contaminated surfaces must take extreme care. |

To address clinical and hazardous waste issues, national level guidelines such as Infection Prevention and Control Guidelines (IPCG) (July 2020) have been prepared and practiced by the Ministry of Health and Medical Services (MHMS). This guidelines is intended to ensure consistency with best practice, available evidence and international standards.

However, it has been observed that weak management at the on ground health facility level hinders the implementation of the guidelines for health care waste management, including proper waste segregation and storage and maintenance of incinerators.
Recognizing that sanitary or engineered landfills are unlikely to be available in remote locations, another option is the safe burial of health care waste on health care facility premises. On-site disposal represents an acceptable disposal option only if certain requirements are met as follows:

- Restricted access to disposal site by authorized personnel only
- The lining of burial site with a material of low permeability such as clay to prevent groundwater pollution
- Limit use to hazardous materials that cannot safely be incinerated to maximize the lifetime of a landfill.

Notwithstanding the availability of health care waste management guidelines, it is apparent that there is considerable scope for adopting more rigorous health care waste management practices in health centers and training centers.

### 3.1 Health Care Waste Management Plan (HWMP)

Nila isolation unit will follow a healthcare waste management process, including sorting, handling, storage, and final disposal of solid HCW outlined in good international practices and Infection Prevention and Control Guidelines (IPCG) etc. The following section briefly describes guidance for health care wastes segregation, handling, storage, and final disposal indicated in the MHMS guidelines and good international practices.

#### 3.1.1 Waste Segregation

Segregation of health care waste is intended to ensure that wastes are properly identified and separated and that different waste streams are handled and disposed of correctly. It typically involves sorting different wastes into color-coded plastic bags or containers at the source. Recommended handling and disposal practices for different categories of health care waste will vary according to the resources available to health care facilities. Examples of WHO (1999a) recommended health care waste handling practices appropriate for health care facilities that apply minimal waste management programs are:

- General health care waste (in colored coded bags or containers) should join the domestic refuse stream for disposal.
- Sharps should be collected together into puncture-proof yellow safety boxes and held for high-temperature incineration. Encapsulation and disposal to a secure landfill is a suitable alternative for sharps.

#### 3.1.2 Clinical waste treatment and disposal

Highly infectious waste should be sterilized by autoclaving where possible. For other infectious waste, disinfection is sufficient to reduce microbial content. Treated infectious waste should then be deposited in yellow bags and containers marked with the international infectious substance symbol. Incineration is the preferred method for disposal of infectious waste, although landfilling is also appropriate. Blood should be disinfected before discharge to the sewer system or wastewater treatment plant, if available, or maybe incinerated.
Since the existing health care facility of the proposed subproject does not have autoclaving and incineration facilities, the following protocols and practices that are outlined in the Infection Prevention and Control Guidelines (IPCG) will be practiced.

**Table 2** Waste Segregation and recommended disposal methods outlined in the Infection Prevention and Control Guidelines (IPCG)

| | **Waste type** | **Waste bag colour** | **Disposal** |
|---|---|---|---|
| **General waste** | Kitchen refuse, paper waste, boxes, bottles, plastic containers | black | Incinerate/Burn in the designated facility |
| **Sharps** | Needles, broken or disposal syringes, razors, lancets, scalpel blades | sharps container yellow or red | Incinerate/Burn in the designated facility , then bury |
| **Solid infectious and/or clinical waste** | Dressings, gauze, or other items contaminated with blood, pus, faeces or other body fluids; human tissue; body parts; paper specimen collection cups | yellow or red | Incinerate/Burn in the designated facility |
| **Liquid and clinical waste** | Blood, urine, faeces, pus, sputum, spinal and peritoneal fluids, pathology specimens | no bags | Drain fluids into toilet or utility sink; or place in contaminated waste bin, and Incinerate/burn in the designated facility |
| **Laboratory waste** | Used culture plates, specimen containers, specimens | yellow or red | Sterilise, place in contaminated waste binds, and Incinerate/burn in the designated facility |
| **Cytotoxic waste** | Cancer treatment drugs and used consumables | Purple | Incinerate/Burn in the designated facility |
| **Pharmaceutical waste** | Tablets, mixtures and injectables | Yellow | Incinerate/Burn in the designated facility |

### 3.1.3 Building and using a simple stove for burning wastes

Since the existing facility has no incineration equipment available, burning will be done in a simple, large stove as illustrated in the figure 1 below. Open burning is dangerous; therefore, all waste will be burned or incinerated in special stoves located in enclosed (properly fenced) areas. The subproject will construct/install a special stove(s) as per the illustrations (figure 1 below). This special stove will be

located near the designed waste pit area, and both waste pit and stove will be well fenced to prevent from unauthorized person accessing the area.
Below are basic guidelines for building and using a simple stove for burning waste, and the waste pit. The subproject will:

1. Select a site downwind from the healthcare facility
2. Build a simple stove using local materials (mud or stone), or a used oil drum
3. Place the stove on hardened earth or a concrete base
4. Make sure the stove has:
   - Sufficient air inlets underneath to burn well,
   - Loosely placed metal bars to hold wastes and allow ashes to fall below,
   - Enough space to add waste at the top and to remove ashes from below,
   - Long enough chimney to allow for good draught and removal of smoke.
5. Burn all burnable waste, such as paper and cardboard, as well as dressings and other contaminated wastes
6. If the waste is wet, add kerosene so that a hot fire burns all the waste. Store waste for incineration in covered rubbish bins
7. Ash from the stove or incinerator can be treated as non-contaminated waste. Note, however, that sharps, even after incineration, may be dangerous and should be buried in the designated waste pit.

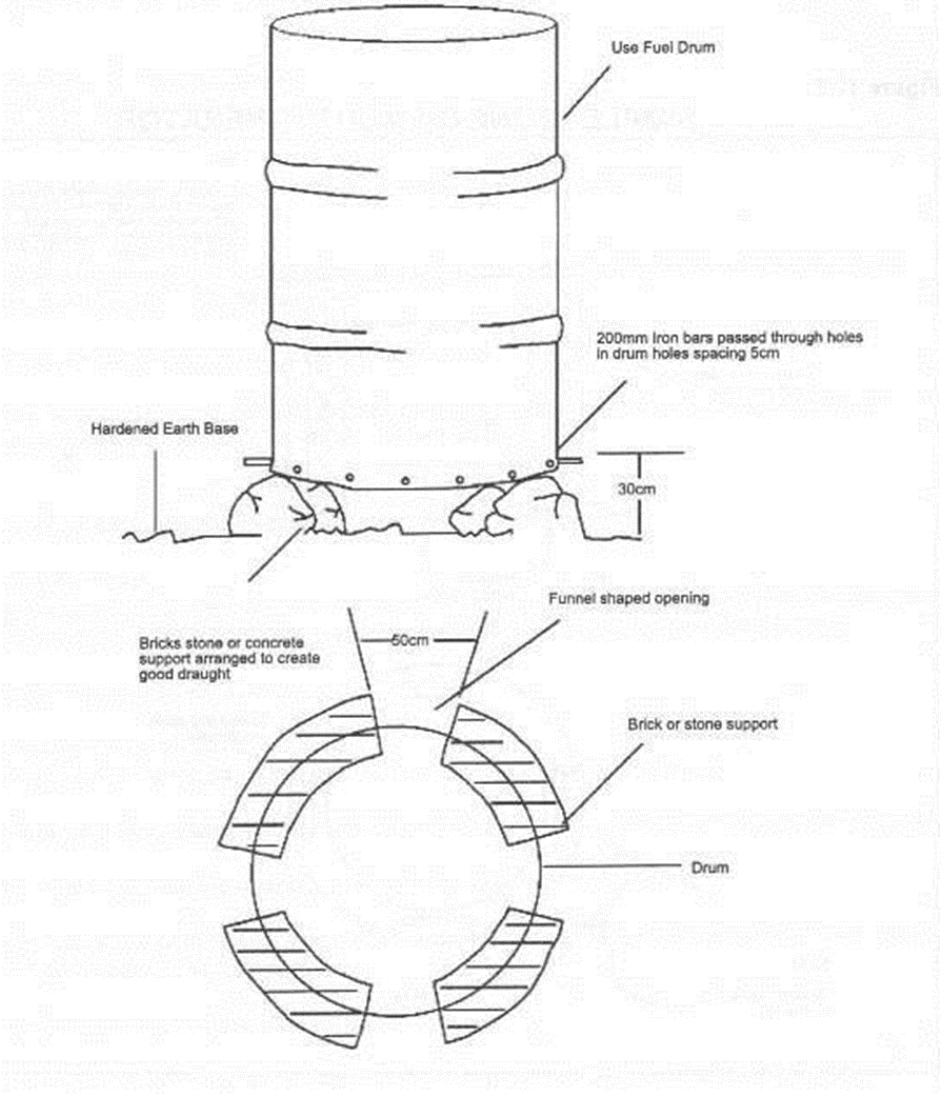


Figure 1 Simple oil drum incinerator Source: Infection Prevention and Control Guidelines (IPCG)

### 3.1.4 Waste disposal by burying

When clinical and non-clinical wastes cannot be burned or incinerated, waste must be buried. When wastes are buried, certain requirements must be met so that children and animals cannot dig up the waste. **Note**: Sharp objects may not be destroyed by burning and may later spread tetanus infection. Dispose of all sharp objects by putting them underground, even after burning.

The following procedures for making and using an underground waste disposal site will be followed:

1. Select a site that:
    - is at least 50 meters (150 feet) away from any water source, to prevent contamination of the water supply.
    - has proper drainage, is located downhill from any wells, and is free of standing water.
    - is not in an area that floods.

2. Dig a pit 1 meter (3 feet) wide and 2 meters (6 feet) deep. The bottom of the pit should be 2 meters above the water table.
3. Fence in the site to keep animals and children away.
4. Wear heavy gloves when handling waste buckets.
5. Empty buckets of non-burnable waste into the pit every day.
6. Cover the waste with a thin layer of earth each day. The final cover should be 10 centimetres deep.

**Note**: General waste is the only waste that can be disposed of in a municipal garbage facility (i.e. landfill). It is illegal and dangerous to dispose of other wastes with municipal garbage.

## 4 General waste handling

### 4.1 Garbage storage and disposal protocols

Garbage should be removed at least twice daily and no garbage should be left in clinic/hospital facility areas overnight. Not only are many common pests capable of transmitting infection, but the sight of insects and pests within the hospital environment can be very disturbing to patients, staff, and visitors alike. It is, therefore, a basic requirement of the hospital cleaning program that adequate attention be paid to preventive and protective measures designed to minimize this potential form of cross infection.

In general, six elements are essential in any effective program for the control of pests in a clinic/hospital facility.

- Thorough, constant cleaning of all potential areas of infestation
- Regular, careful inspections for evidence of pests
- Storage of waste and garbage in water-tight containers
- Thorough cleaning of all garbage containers after use
- Daily removal of all stray garbage not placed in correct receptacles
- Proper storage of all goods and supplies likely to attract pests

It is important to train all healthcare workers at all level, including physicians and nurses to keep contaminated and non-contaminated waste separate. Only a small percentage of the waste generated by a healthcare facility is clinical and hazardous waste that must be specially handled to reduce the risk of infections or injury. Segregation of the waste at the point where it is generated can conserve resources by greatly reducing the amount of waste that needs special handling. Poor separation of waste at the point where it is generated leads to large amounts of waste that must be handled especially – which can overwhelm the disposal system, lead to improper disposal of clinical and hazardous waste, and put everyone at risk.

### 4.2 Waste Handling

Staff and students should handle medical and hazardous waste as little as possible before storage and disposal. The more waste is handled, the greater the chance for accidents. Special care must be taken when handling used needles and other sharps, which pose the greatest risk of accidental injury and infection.

- ***Emptying waste containers:*** Waste containers that are too full also present greater opportunities for accidents. Waste should be removed before the containers become completely full. Dispose of sharps containers when they are 3/4 full. (When sharps-disposal containers become too full, people may push sharps into the container, causing injury.)
- Staff should wear utility gloves, heavy-duty apron, and boots when collecting waste.
- Do not collect clinical and hazardous waste from the storage areas by emptying it into open carts or wheelbarrows, as this may lead to spills and contamination of the surroundings, may encourage scavenging of waste, and may increase the risk of injury to staff, patients, and visitors.
- Handle clinical and hazardous waste as little as possible.

### 4.3 Interim storage of waste

If possible, the final disposal of waste should take place immediately, but it is often more practical to store waste briefly in the facility before final disposal. Interim storage should be short-term.
If it is necessary to store clinical and hazardous waste on-site before final disposal:

- Place waste in a closed area that is minimally accessible to staff, patients, visitors and animals. As few people as possible should come into contact with stored clinical and hazardous waste.
- All containers should have lids to prevent accidental contamination, spillage, and access by insects, rodents, and other animals.
- Contaminated clinical and hazardous waste poses serious health threats to the community. Never store clinical and hazardous waste in open containers & never throw waste into an open pile.

## 5 Occupational Health and Safety

All the healthcare workers under the subprojects will strictly follow the protocols and procedures stated in the chapter 6 Occupational Health and Safety of the National level Infection Prevention and Control Guidelines (IPCG) (2020). The IPCG is attached as the annex (Annex I) of this document. The hospital in charge will supervise and monitor the application of the stated occupational health and safety by all healthcare workers at all levels.
The PMU and the Environmental Health Division within the MHMS will conduct the training on occupational health and safety practices to all healthcare workers prior to the operation of the respective subprojects.

## 6 Infection Prevention and Control Protocols

The National level Infection Prevention and Control Guidelines (IPCG) (2020) (Annex I) has detail and comprehensive protocols and guidance for the infection prevention and control at the health care facilities. All the healthcare workers under the subproject will strictly follow the protocols and procedures stated in the National guidelines.

## 7 Implementation and monitoring arrangement for the Operational manual at subproject level

According to the National IPC guideline, all health facilities are required to have a management committee each that deals with IPC. This is an integral aspect prescribed by the IPCG for establishing an improved governance structure that fosters better waste management practices at the Facility level but also control mechanism at the national level. The management committee at the healthcare facility level would link with the national IPC committee to ensure that objectives of the IPCG and related policies from which it is transcribed, are achieved to a minimum level by the health facility. The management committee would also oversee the daily implementation of waste management practices at the health facility level and ensures that health workers receive relevant training needs by liaising with the Public Health Emergency and Surveillance Unit (PHESU) of the Ministry of Health and Medical Services (MHMS).
For small-scale health facilities such as clinics that have less than 10 workers which is sparsely captured by the IPCG, a focal team will be formed and assigned to spearhead the on the ground practices of implementing the operational manual in respective health clinics. The focal team will include but not limited to (i) the manager/supervisor of health care facility, (ii) health care specialist(s)/worker(s), and (iii) an admin assistant. Below table indicates the institutional arrangement of implementing and monitoring of this HCWM and HSE plan.

| Name | Position | Assigned Role for HCWM implementation |
|---|---|---|
| Moscs m Lamana | Supervisor (RN) | Supervisor of Health facility. Give instructions and coordinate wor shifts. |
| Jonica Gregary | RN/Midwife | Waste management |
| Ruth Iele | Registered Nurse Aid (RN) | Waste management |
| SR Chris Konasa | Church Employee | Waste Disposal site overseer |
| Marlin Pae | Pharmacist | Waste management |
| Emelina Georgine | Pharmacy Aid | Waste management |
| James Faye | Microscopist | Waste management |
| Tony Iele | Clinic Driver | Waste Management |

The team will be in charge to ensure that the above-mentioned protocols and practices set in this document are set on ground, the required staff are assigned with designated tasks and being trained properly. As needed, the lead person of the team will liaise with the management committee for the set-up of proper waste disposal facilities such as an incinerator, ash pit and a landfill pit. The team will ensure that all the set procedures are implemented, monitored and reported regularly.

## 8 Training plan for waste management and occupational health and safety

| Training subject | Target participants | Trainer(s) | Training Frequency |
|---|---|---|---|
| Healthcare waste management | All healthcare workers of the proposed clinic/hospital | PMU | One time prior to the subproject operation.<br><br>A refresher course could be conducted during operation period by the Public Health Emergency and Surveillance Unit (PHESU) of the Ministry of Health and Medical Services (MHMS). |
| Occupational Health and Safety and IPC | All healthcare workers of the proposed clinic/hospital | PMU and the Public Health Emergency and Surveillance Unit (PHESU) of the Ministry of Health and Medical Services (MHMS). | One time prior to the subproject operation.<br><br>A refresher course could be conducted during operation period by the Public Health Emergency and Surveillance Unit (PHESU) of the Ministry |

| | | | |
|---|---|---|---|
| | | | of Health and Medical Services (MHMS). |

## 9 Budget allocation

| Activity | Est. Amount (SBD) | Implementation Responsibility |
|---|---|---|
| Training (mentioned in sec 7) | $60,000. | PMU - MHMS |
| Construction/ installation of incinerator/ burning facility (for those clinics which does not have existing burning facility) | Minimum $5,000.00 | PMU |
| Operation and maintenance cost | | Clinic |
| Regular refresher trainings | | Clinic |

**MINISTRY OF HEALTH AND MEDICAL SERVICES**

**SOLOMON ISLANDS**

# Infection Prevention and Control Guidelines

July 2020

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# Foreword

To meet the highest standards of good Infection Prevention and Control will be challenging and will not be achieved overnight. It requires cooperation from many disciplines, Nationals, provinces and each health facilities and health care facilities. Priorities of these guidelines will agreed and introduced in a stepwise fashion to ensure a cycle of continues quality improvement.

It is important that all individuals adapt a positive attitude and play an active role in ensuring infection prevention and control standards and practice become embedded in our Health care systems in line with the Role Delineation Policy, that such noncompliance with the established standards is automatically identified and rectified.

These Infection Prevention guidelines bring to the health care, a new beginning and I asked that all of us to support subsequent to implementation.

Finally, would like to thank all for the continuations supports to compile this Guideline s and especially for the Technical Assistant that rendered by WHO to Ministry of Health and Medical Services.

# Acknowledgements

The National Infection Prevention and Control is a land mark in the development of this field within the Health Care systems in Solomon Islands. The Influence of the Infection Prevention and Control on safe guards the staff and patients cannot be overstated.

These guidelines are the product of the hard work, consultation and collaboration between the Ministry of Health and Public Health Emergency and surveillance unit, and the WHO supporting with the Technical assistance from the Griffith University, Australia. The considerations and validations to develop and write these guidelines was appreciated by the Government of Solomon Islands through the Ministry of Health and Medicals services.

There will be challenges to implement ahead but the MHMS remains hopeful that team work will prevail this Infection Prevention and Control guidelines.

Finally, the MHMS expresses its appreciation to all other individuals and institutions who continue to work tirelessly towards improving the **SAFE** delivery of the Health Care Services to the people of Solomon Islands.

# List of Contributors and Reviewers

These IPC Guidelines have been commissioned by the World Health Organization (WHO) in collaboration with the Ministry of Health and Medical Services (MHMS) of the Solomon Islands. From January – March 2019 a short-term consultancy was deployed to undertake a national review of IPC capacity and the national IPC guidelines which had not been reviewed since 2004. These guidelines have been reviewed to ensure consistency with best practice, available evidence and international standards. The overall process was led by Dr Peta-Anne Zimmerman (Griffith University Graduate Infection Prevention and Control Program) under the direction of the national lead for IPC in the Solomon Islands.

Individual chapter reviewers are listed below:

| **CHAPTERS** | **Griffith University/WHO** | **MHMS** |
|---|---|---|
| Chapter 1 INTRODUCTION | Peta-Anne Zimmerman | MHMS PHESU |
| Chapter 2 STRUCTURE AND MANAGEMENT OF AN IPC PROGRAM | Peta-Anne Zimmerman | MHMS PHESU |
| Chapter 3 INTRODUCTION TO HAI AND IPC | Peta-Anne Zimmerman | MHMS PHESU |
| Chapter 4 STANDARD AND TRANSMISSION BASED PRECAUTIONS | Peta-Anne Zimmerman | MHMS PHESU |
| Chapter 5 SPECIAL HEALTHCARE AREAS | Peta-Anne Zimmerman | MHMS PHESU |
| Chapter 6 OCCUPATIONAL HEALTH AND SAFETY | Peta-Anne Zimmerman | MHMS PHESU |
| Chapter 7 SURVEILLANCE FOR IPC | Peta-Anne Zimmerman | MHMS PHESU |

# Abbreviations

| | |
|---|---|
| ABHR | alcohol-based hand rub |
| AMR | antimicrobial resistance |
| ANTT | aseptic non touch technique |
| BCG | Bacille Calmette–Guerin |
| BSI | bloodstream infection |
| CAP | community acquired pneumonia |
| CDC | Centers for Disease Control and Prevention |
| COVID 19 | Coronavirus disease, SARS-COV-2 |
| ESBL | extended spectrum beta-lactamase |
| HAI | healthcare associated infection |
| HAP | healthcare associated pneumonia |
| HBV | hepatitis B virus |
| HCF | healthcare facility |
| HCV | hepatitis C virus |
| HCW | healthcare worker(s) |
| HH | hand hygiene |
| HIV | human immunodeficiency virus |
| HLD | high level disinfection |
| IPC | infection prevention and control |
| MDR-TB | multi-drug resistant tuberculosis |
| MHMS | Ministry of Health and Medical Services |
| MRO | multi-resistant organism |
| MRSA | methicillin resistant *Staphylococcus aureus* |
| OT | operating theatre(s) |
| PPE | personal protective equipment |
| SOP | standard operating procedure(s) |
| SPC | Secretariat of the Pacific Community |

| | |
|---|---|
| SSI | surgical site infection |
| TB | tuberculosis |
| UTI | urinary tract infection |
| VAP | ventilator associated pneumonia |
| WHO | World Health Organization |
| XDR-TB | extensively-drug resistant TB |

# Glossary

| | |
|---|---|
| Airborne transmission: | Transfer of particles containing infectious agents that are disseminated in the air. Microorganisms carried this way can be widely dispersed via air currents and may remain infectious in the environment for long periods before being inhaled by or deposited onto the susceptible host. |
| Alcohol hand rub: | A waterless alcohol-based product appropriate for rapid hand decontamination between patient contacts. It is recommended for use when hands are not visibly soiled or contaminated with blood and body fluids. |
| Avian influenza: | Avian influenza is an infectious disease of birds and is caused by type A strains of the influenza virus. |
| Contact transmission: | The transmission of infectious agents can be divided into two subgroups:<br><br>direct contact transmission and indirect contact transmission:<br><br>• Direct contact transmission involves direct physical transfer of micro-organisms from an infected or colonised person to a susceptible host.<br>• Indirect contact transmission involves a susceptible person coming in contact with a contaminated (usually inanimate) object, such as a contaminated instrument or piece of equipment. |
| Decontamination: | Cleaning an object by either chemical or physical means to reduce the number of micro-organisms on it. |
| Droplet transmission: | Transfer of infectious agents in the droplets that are generated during coughing, sneezing or talking, and during the performance of certain clinical procedures such as suctioning and bronchoscopy. |
| Disinfection: | A process that kills or destroys most disease-producing organisms, but rarely kills spores. Disinfectants are used on inanimate objects as opposed to antiseptics, which are used on living tissue. |
| Hand hygiene: | Refers to hand washing with soap and water, use of alcohol hand rub and antiseptic solutions. |
| Healthcare associated infection: | An infection that is acquired during hospital admission as a result of health care interventions. |
| N95 Mask: | A disposable filter mask designed specifically to protect the wearer from exposure to airborne (small particle) infectious diseases such as TB by sealing tightly to the face. It has the capacity to filter 95% of airborne infectious particles from the air. |

| | |
|---|---|
| Occupational exposure: | An incident that occurs during the course of a person's employment and involves contact with blood or body substances. Occupational exposure includes:<br><br>• percutaneous injuries or cuts caused by used instruments, such as needles or scalpel blades, and involving blood or other body substances;<br>• contamination of fresh cuts or abrasions with blood or other body substances; and<br>• contamination of the eyes or other mucous surfaces with blood or other body substances. |
| Personal protective equipment: | Gloves, masks, eye protection, gown, caps and aprons worn to protect the wearer from contact with infectious agents. |
| Surgical mask: | A disposable mask designed to protect the wearer against splashes of bodily fluids, and sprays and droplets generated by coughing and sneezing. |
| Sterilisation: | A process that destroys all forms of microbial life, including bacteria, viruses, spores and fungi. This method is used for all items that contact normally sterile areas of the body. |
| Standard precautions: | Precautionary measures designed to reduce the risk of transmission of micro-organisms from both recognised and unrecognised sources of infection in hospitals. Standard precautions involve safe work practices and include the following: hand hygiene, respiratory hygiene/cough etiquette, personal protective equipment, appropriate handling of laundry and appropriate handling of used patient equipment. Standard precautions should be used in all health care interactions. |
| Sharps: | Needles, intravenous spikes, lancets, broken ampoules, scalpel blades and any other sharp object that is capable of causing an injury. |
| Transmission based precautions: | Precautions designed for use in addition to standard precautions with patients who are diagnosed with, or are suspected to have, a specific infectious pathogen whose transmission cannot be prevented through standard precautions alone. There are three types of transmission-based precautions: airborne precautions, droplet precautions, and contact precautions. |

# Chapter 1 INTRODUCTION

## 1.1. Background

Infection prevention and control (IPC) has an integral role in the provision of a safe healthcare environment for both patients and healthcare workers (HCWs) across the continuum of care. Lack of adherence to safe practices or inadvertent exposure to pathogens, including human immunodeficiency virus (HIV), in the healthcare environment can lead to significant morbidity and mortality in patients and HCWs alike. A safe working environment in the healthcare setting includes the provision of a safe physical environment, the use of safe clinical practices, the availability of adequate resources, the provision of safe equipment and consumable items, and a culture of safety for all. Safety in healthcare also includes mechanisms for reporting events that result from an unsafe environment or practice.

Infection prevention and control, particularly in healthcare facilities, is a critical element in interrupting the transmission of priority infectious diseases at all levels of healthcare provision. Communication, accessibility of expertise, and technical advice are recognised as areas in need of improvement in facilitating infection control response to infectious disease threats.

## 1.2. Purpose

The overall purpose of these guidelines is to provide guidance on IPC standards for all levels of health service provision within the Solomon Islands. These guidelines are based upon the World Health Organization (WHO) Core Components of Infection Prevention and Control, Sierra Leone National IPC Guidelines, the previous MHMS Solomon Islands IPC Guidelines, and the Secretariat of the Pacific Community (SPC) Infection Prevention and Control Guidelines.

## 1.3. Guideline use

These national guidelines are generic and should be used in every healthcare facility. As with any generic guidelines, these must be adapted to suit the local situation, whether at a national or local healthcare facility. This should be done in collaboration with the relevant IPC focal point, at the provincial or national level. Under the direction of the National IPC Focal Point, who is tasked with overseeing the development of IPC infrastructure and culture in the Solomon Islands, the Public Health Emergency and Surveillance (National IPC Unit) will be responsible for the development and dissemination (and subsequent review) of guidelines and Standard Operating Procedures (SOPs) for IPC practices. These guidelines and SOPs will be reviewed and updated every three years, to reflect changes in epidemiology, evidence, risks, best practices, and available resources.

To aid translation of the guidelines into practice, a number of conditions are important for healthcare facility leaders and managers as well as policy-leaders:

1. **Infrastructure/system change**: access to the right equipment and supplies, and an environment that is designed and planned to facilitate the guideline recommendations.
2. **Training and education**: a program of routine training, education, and periodic retraining for ALL personnel responsible for IPC (ALL HCWs).
3. **Monitoring, evaluation and feedback**: a program of regular supervision and feedback is in place in relation to the guidelines recommendations including a surveillance program.
4. **Awareness raising/promotion**: the practices described in the guidelines are reinforced through awareness raising (such as posters displayed in clinical settings).
5. **Safety culture**: managers and leaders AT EVERY LEVEL of healthcare service delivery show their visible support for the National IPC Guidelines' recommendations to help foster, develop and reinforce a culture of patient and HCW safety and IPC.

## 1.4. General policy statements

Summary of the problem:

Healthcare associated infections are a significant threat to patient and HCW safety in the Solomon Islands, and there is a need to improve health outcomes, prevent future outbreaks, and establish a culture of safety in the delivery of healthcare.

Available evidence:

Situation analysis performed by external consultants highlighted clear vulnerabilities in all levels of healthcare delivery in the Solomon Islands, which relate to IPC infrastructure and practice that contribute to the ongoing threat to the health and safety of patients and HCWs, including the threat of HAIs.

Policy direction:

- The MHMS of Solomon Islands have prioritised a series of actions to address the deficits in IPC across the entire health system with the aim of improving the safety of patients and HCWs.
- Patient and HCW safety can be greatly enhanced through the implementation of simple measures such as improved hygiene conditions, appropriate management of potentially infectious patients including use and consistent availability of personal protective equipment (PPE), improved healthcare waste management and the safe use and disposal of single use/single patient use equipment, injection safety and hand hygiene.
- The National IPC Guidelines, containing recommended instructions and practices for patient and HCW safety, are an important component of a comprehensive national IPC strategy. The WHO Core Components for Infection Prevention and Control[1] describe eight features of such programs that are considered essential and these are presented in Table 1.
- The National IPC Guidelines have been co-developed and updated by the National IPC Focal point in collaboration with WHO, with review and approval by the Ministry of Health and Medical Services.
- The Guidelines will be made readily available for HCWs, patients and communities and will be updated regularly and supported by summary and other documents
- Emphasis will be placed on maximising the dissemination and implementation of the Guidelines across all levels of the healthcare system.

**Table 1: WHO Core Components of Infection Prevention and Control Programs (2016)**

| Category | Component |
|---|---|
| IPC Programs | An IPC program with a dedicated, trained team should be in place<br><br>In each acute health care facility for the purpose of preventing HAI and combating anti-microbial resistance (AMR) through IPC good practices.<br><br>Stand-alone, active national IPC programs with clearly defined objectives, functions and activities for the purpose of preventing HAI and combating AMR through IPC good practices should be established. National IPC programs should be linked to other relevant national programs and professional organizations. |
| Evidence-based guidelines | Evidence-based guidelines should be developed and implemented for the purpose of reducing HAI and AMR. Education and training of the relevant health care workers on guideline recommendations and monitoring of adherence with guideline recommendations should be undertaken to achieve successful implementation. |
| Education and training | At the facility level, IPC education should be in place for all health care workers by utilizing team and task-based strategies that are participatory and include bedside and simulation training to reduce the risk of HAI and AMR.<br><br>The national IPC program should support education and training of the health workforce as one of its core functions |

| | |
|---|---|
| Surveillance | Facility-based HAI surveillance should be performed to guide IPC interventions and detect outbreaks, including AMR surveillance with timely feedback of results to health care workers and stakeholders and through national networks. National HAI surveillance programs and networks that include mechanisms for timely data feedback and with the potential to be used for benchmarking purposes should be established to reduce HAI and AMR. |
| Multimodal strategies | At the facility level, IPC activities should be implemented using multimodal strategies to improve practices and reduce HAI and AMR.<br><br>National IPC programs should coordinate and facilitate the implementation of IPC activities through multimodal strategies at the national or sub-national level. |
| Monitoring, audit and feedback | Regular monitoring/audit and timely feedback of health care practices should be undertaken according to IPC standards to prevent and control HAIs and AMR at the health care facility level. Feedback should be provided to all audited persons and relevant staff.<br><br>A national IPC monitoring and evaluation program should be established to assess the extent to which standards are being met and activities are being performed according to the program's goals and objectives. Hand hygiene monitoring with feedback should be considered as a key performance indicator at the national level. |
| Workload, staffing and bed occupancy | In order to reduce the risk of HAI and the spread of AMR, the following should be addressed:<br><br>1. bed occupancy should not exceed the standard capacity of the facility;<br>2. health care worker staffing levels should be adequately assigned according to patient workload. |
| Built environment, material and equipment | At the facility level, patient care activities should be undertaken in a clean and/or hygienic environment that facilitates practices related to the prevention and control of HAI, as well as AMR, including all elements around the WASH infrastructure and services and the availability of appropriate IPC materials and equipment. At the facility level, materials and equipment to perform appropriate hand hygiene should be readily available at the point of care. |

# Chapter 2 STRUCTURE AND MANAGEMENT OF THE IPC PROGRAM

## 2.1. Introduction

An infection control program is a set of organised activities designed related for the prevention and control of infectious diseases and HAIs in the healthcare environment. An IPC program can be organised at all levels of healthcare delivery.

Infection prevention and control programs have proven to be successful in lowering the incidence and spread of infectious diseases provided the programs are comprehensive, and include surveillance and prevention activities and staff training. However, it is imperative that a governance structure at national level is established to regulate national standards and to promote and effectively implement standards for infection prevention and control.

The purposes of an IPC program are to:

- To prevent the transmission of HAIs between patients, healthcare workers and visitors
- To prepare healthcare facilities to detect early outbreaks of HAIs and respond promptly and effectively manage such situations
- To be prepared to manage and respond to epidemics of emerging infectious diseases in the community and healthcare facilities
- To work with community health colleagues to better coordinate and respond to large scale epidemic, and
- To prevent the transmission of multidrug resistant organisms.

## 2.2. Responsibility and authority

The MHMS has the responsibility for ensuring that the healthcare workforce, patients, and the community are protected from HAIs. In recognition of the need for IPC strengthening in all levels of health service delivery, private, and faith-based the MHMS is committed to:

- Developing national IPC guidelines, policies, and standard operating procedures (SOPs)
- Establishing and supporting the MHMS IPC unit and IPC focal persons at the national, provincial, and healthcare facility level
- Establishing a system for monitoring, evaluating, and reporting key IPC indicators
- Instituting the governance structure within which these units and personnel will operate, as defined in the National IPC Policy document

The MHMS provides guidance on the institution of IPC programs at all MHMS healthcare facilities by outlining roles, responsibilities, reporting, and accountability processes at each level of the health care system.

It is essential that health authorities and leaders support and promote the IPC program within all levels of healthcare delivery through the following strategies:

- Ensure that IPC officers are adequately resourced through appropriate provision of a work space, computer and internet access
- Ensure microbiology laboratory support to work with the IPC officer and to use microbiology data for IPC surveillance and early detection of HAIs
- Regularly monitor and evaluate compliance with IPC standards and program interventions
- Endorse the role of the IPC officer
- Attend and participate in IPC committee meetings
- By having responsibility for IPC incorporated into job descriptions of all HCWs
- Ensuring that there is senior Medical Practitioner participation in the IPC program and IPC committee meetings
- Ensure that IPC key performance indicators are incorporated into the healthcare facility business plan

## 2.3. IPC Committee

Responsibility for coordinating, monitoring and evaluating the IPC program is delegated by the hospital or healthcare facility management to a group of relevant staff who form an IPC committee. An IPC committee should be formed at all hospitals, as well as at the national level.

The purpose of the infection control committee is to:

- Provide a strategy for the implementation (including unplanned events, such as outbreaks) and improvement of the IPC program to management
- Monitor the implementation of IPC policies
- Develop policies, guidelines and procedures relating to IPC and ensuring their currency and accessibility to staff
- Review problems that may cause transmission of infection, and identify areas for intervention by using surveillance and other data
- Assess and promote improved practice at all levels of the healthcare facility
- Ensure and monitor appropriate staff training in IPC and safety management, provision of safety materials such as personal protective equipment and products
- Ensure that there is a defined program for HAI surveillance that includes collection, analysis and reporting back of data to departments and clinicians
- Ensure that reports on the occurrence of HAI are received and that actions resulting from these reports are determined and monitored
- Provide guidance, advice and support to the IPC officer/team, and
- Ensure that appropriate resources are consistently available, used efficiently and cost effective

Members of the committee should include staff from a variety of departments. Membership must include, but not be limited to:

- The Head of the Hospital or Healthcare facility or his/her designate
- The senior administrative officer who is in a position to allocate necessary resources etc
- IPC Officer/team
- One or more senior medical officers
- Midwife or doctor working in obstetrics
- Housekeeper
- Operating room staff responsible for sterilisation
- Clinical Microbiologist or microbiology technician or laboratory personnel
- Pharmacist
- Chair of the AMR Committee

The IPC committee should not have more than five to ten members or it becomes unmanageable. However, specialists from various departments (for example, the pharmacist or laundry manager) can be called to meetings when a problem arises in their department, or when they can offer specialised information.

The IPC committee should meet on a regular basis (at least every two months) to discuss infection prevention activities, and to solve problems. In the event of a critical incident or outbreak situation, the committee should be able to convene promptly.

The committee should establish and document “terms of reference” and have these approved by an appropriate authority, such as a senior healthcare administrator or director of health services. Appendix 1 provides a generic Terms of Reference.

The committee should appoint a secretary and keep records of its activities. An agenda should be prepared and distributed prior to each meeting. Minutes of the previous meeting should be distributed with the agenda.

The agenda should include a:

- review of monitoring and surveillance activities
- report on actions taken on problems identified at the last meeting
- report on training activities and needs
- list of new problems, and
- set of recommendations for change, if needed, and a list of who will be responsible

For each agenda item, a designated person should be responsible for preparing a report, and for applying the recommendations for change. At each meeting, the designated person (or people) should report on progress made toward specific goals.

**Meeting minutes should adopt a consistent format such as the one below.**

| | |
|---|---|
| | *List all those present at the meeting* |
| 1. Present: | |
| 2. Apologies: | *List apologies received* |
| 3. Minutes of meeting: | *Confirmation of the minutes of the previous meeting as a true and correct record of proceedings. (Once confirmed, minutes should be signed off by the Chairperson.)* |
| 4. Matters arising: | *Discussion on any matters arising from previous minutes* |
| 5. Reports: | Consideration of reports as circulated or presented to meeting |
| 6. General business: | *New business as listed on the agenda or any other matters raised at the meeting* |
| 7. Date and time of next meeting: | *Enter the agreed upon meeting date and time* |
| 8. Meeting closed: | *Note the time the meeting closed* |
| 9. Signature block: | *For the Chairperson to sign once minutes have been confirmed* |

Meeting minutes should include the following information:

- A brief (few sentences) summary of each agenda item's discussion
- Recommendations of tasks or actions to solve a problem (e.g. training program, buying equipment, making posters)
- The name of the person to be responsible for applying the changes recommended, and the date (deadline) by which the person or task group should have carried out the assigned task
- The results of the actions taken to solve a problem

Other information to note includes: Was the goal accomplished? If there were problems, were they identified and solved? How were problems solved (e.g. staff were trained in infection control procedures, supplies were purchased)?

Keeping a record of this information will make it easier to solve a similar problem later. Minutes should be written as soon as possible after the meeting and distributed amongst members and appropriate clinical governance groups. The committee secretary should maintain the master set of minutes.

The IPC committee should decide how IPC practices can be applied based on the amount of available equipment. It is important to make decisions that are practical and standard.

Good communication and exchange of ideas with staff can improve work habits and attitudes. Staff should be informed about the IPC committee and the purpose of the program. Healthcare service management should share ideas and materials with staff, and be ready to listen to their perspective. Good communication at all staff levels is the key to a successful IPC program.

A work plan for the IPC program, via the IPC committee should identify key priorities for the period (3 months, 6 months, 9 months, 12 month) of the program – such as:

- Priorities for policy development
- Priorities for SOP development
- Priorities for training
- Priorities for surveillance
- Systems for documenting and recording
- Systems for monitoring implementation of agreed priorities
- Systems for identifying and addressing blocks to implementation with clear action plan for resolution
- Individuals responsible for delivering each aspect of the work program

## 2.4. IPC Officer

Each hospital or healthcare facility should have a designated person responsible for implementing IPC policies and activities, and developing methods for reviewing practices to minimise the transmission and incidence of infection. This person may be a nurse but may also be any other person with knowledge of infections (e.g. laboratory staff, medical officer). Ideally, this person would have received specialist training in IPC.

The IPC officer must be a member of the IPC committee. The IPC officer's role is to work with all departments in the implementation of the IPC program.

The IPC officer's responsibilities are to:

- Coordinate, conduct and record training activities
- Carry out HAI surveillance activities
- Develop and disseminate IPC policies and SOPs
- Observe IPC practices and make suggestions for improvement
- Help identify problems and assist in problem-solving, and
- Report to the IPC committee at every meeting.

It is generally recommended that there be one full-time equivalent infection control nurse per 125 hospital beds (see sample position description in Appendix 2).

## 2.5. Education and training of healthcare workers, patients and visitors

An IPC program can be successful only when everyone is involved. People are usually willing to change bad habits to good ones when they understand the reasons and the importance of each procedure. Therefore, all levels of healthcare delivery must plan frequent in-service education programs for staff, patients and visitors. In-service training is an ongoing process. In-service training should be used to teach good practices, change bad habits, and demonstrate new equipment or procedures.

Every level of staff (i.e. nurses, doctors, housekeepers, cleaners, students) need to learn the importance of IPC. Even workers who have little contact with patients, such as pharmacy or kitchen staff, should be included. All staff have a responsibility in preventing infections in the healthcare facility.

All HCWs should:

- understand how infection spreads in the healthcare facility
- know the important role each staff member plays in preventing infection, and
- be able to describe or demonstrate various methods of preventing the spread of microorganisms, such as hand hygiene.

The training program should be made as interesting as possible by using discussion, audio-visual aids, posters, role playing and games. The following program should be established.

### 2.5.1. Orientation

IPC Orientation is a basic program for all new staff, and should include the principles and methods of preventing the spread of infection within staff members' unit or department. The new employee should know their responsibility in the prevention of infection.

### 2.5.2. Mandatory annual IPC in-service education

A program of frequent in-service education should be planned for all staff, beginning as soon as the infection control guidelines are introduced. Regularly scheduled in-service education workshops can be used to identify and solve problems, introduce new techniques, and provide general reminders about the importance of safe practices to prevent the spread of microorganisms.

### 2.5.3. Patient education

It is the HCW's responsibility to instruct patients about their role in the prevention of infection or the spread of infection. For example, a HCW may teach patients with respiratory illnesses to cough into a handkerchief/tissue, or teach patients with enteric disease to thoroughly wash their hands before and after using the toilet, or teach a patient with a wound to keep it clean and dry.

### 2.5.4. Visitor education

Visitors should be made aware of the risks they pose by spitting in halls, using toilets improperly and not washing hands, crowding around patients, and handling intravenous sets, catheters and other patient care equipment. Multi-modal methods should be used to give one-on-one education in order to increase visitors' knowledge about infection prevention. An excellent time to educate visitors is when they are waiting in the hospital or clinic. For example, infection prevention information can be provided using posters or a TV screen (if available).

### 2.5.5. Steps to a successful training program

In-service education programs can be short, simple and interesting. In addition, HCWs can be a role model for other staff and patients. Staff and others should be reminded to wash their hands frequently, and perform tasks correctly. A training program should:

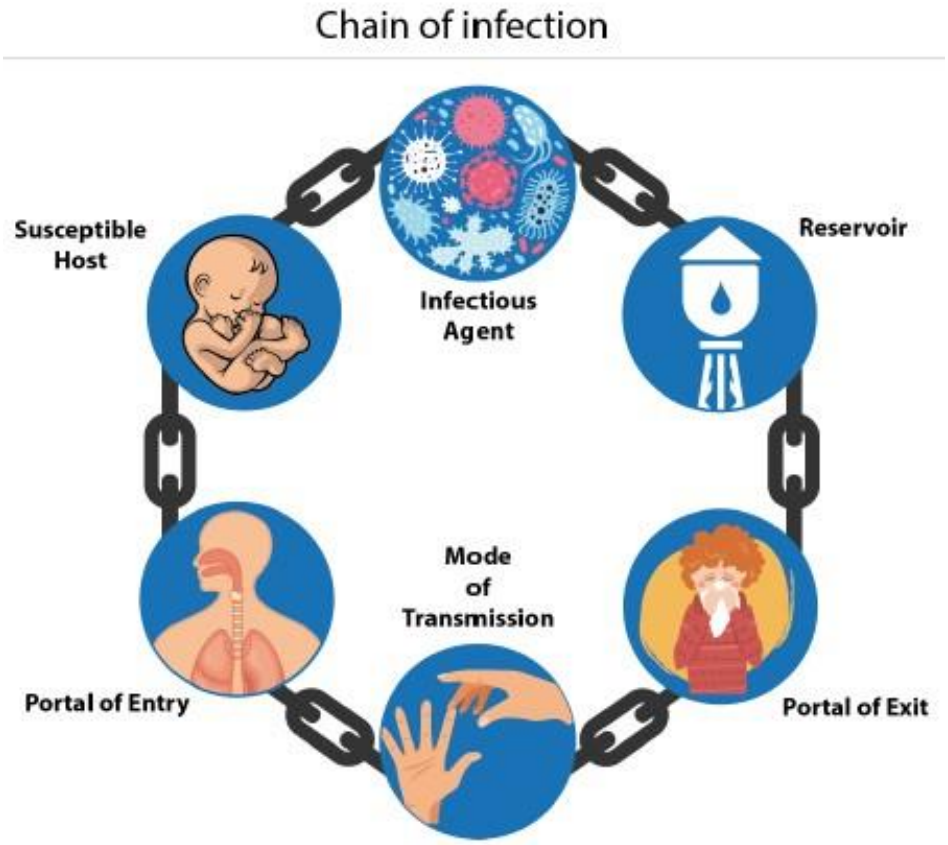
- Clearly identify the group that is being trained (e.g. nurses, community health workers, cleaners, laboratory technicians)
- Be carefully planned. It will be necessary to decide on:
  - **what** will be taught
  - **how** it will be taught (what teaching aids and supplies are needed) o **when** it will be taught (making use of a schedule), and
  - **where** it will be taught (e.g. in a classroom, on the ward)
- Describe clearly the tasks that staff need to learn at the beginning of the session
- Determine what they know before you start (it may be more or less than you expect)
- Be realistic: train people to use facilities that are available
- Give necessary information about the reason for certain procedures and about the consequences of not carrying them out (e.g. infection or even death)
- Make learning interesting by:
  - encouraging discussion
  - linking information about caring for patients and cleanliness in healthcare facilities with local tradition and beliefs, and
  - using teaching aids such as posters, field trips, role playing, and audio-visual aids
- Select a teaching method that is best for the specific audience
- Provide information, examples and training skills
- Teach skills using practice session of tasks
- Use case presentations to identify problems, and exchange ideas on how to better handle a given situation
- Give learners feedback on their practice (in a respectful way) so they will know how well they are doing
- Evaluate the training by watching learners do the tasks on the job or issue a survey, and
- Use the results of the evaluation to improve training

# Chapter 3 INTRODUCTION TO HAI AND IPC

## 3.1. The Chain of Infection

In order for an infectious agent to successfully spread from one host to another, several conditions must be met. This is referred to as the chain of infection. If this 'chain' is broken at any stage, the infection cannot spread and becomes contained. We will use the basic human flu (influenza) as an example in this interactive below to explain the chain of infection.

Figure 1: Chain of Infection




**Infectious agent**

First there must be something that causes the disease. The flu is caused by an influenza virus.

**Reservoir**

A reservoir is the place the organism is found and sustained. This can be an animal or it can be something in the environment such as water, food and soil. Humans, birds and pigs serve as reservoirs for the influenza virus.

**Portal of exit**

The infectious agent must then be able to leave the reservoir. Infected humans shed the virus through respiratory mucus, particularly through sneezing and coughing.

**Mode of transmission**

Following its exit from the reservoir, the infectious agent must be able to transmit to the host and survive the journey. Influenza virus can survive in bodily fluids for a limited time, and typically is transmitted via contact, and especially inhalation. After sneezing or coughing, infected respiratory fluids can either be directly inhaled by a nearly human (inhalation) or land somewhere which then comes into contact with another person's eyes, nose or mouth e.g. tissue (contact).

Infectious agents can be spread in five main ways:

1. Contact (direct and indirect)

   Direct skin to skin contact with contaminated bodily fluids can lead to transmission and subsequent infection. Contact can also be indirect, when infectious particles are able to survive on a nonliving object (fomite) for a period of time, such as a door handle or a used tissue.
2. Inoculation (bloodborne)

   A type of contact transmission, this involves direct or indirect blood to blood contact. Often this occurs through sharing needles, or through cuts and other skin openings.
3. Ingestion

   Also a type of contact transmission, the consumption of contaminated food and drink can lead to infection. If the infectious agent survives the digestion process, it can enter the body via the mucous membranes lining the gut. The infectious agent then replicates and exits via faeces.
4. Inhalation (droplet and airborne)

   Infectious agents can cross the mucous membranes lining the respiratory system, and are shed from the host through respiratory mucous (a type of bodily fluid) expelled via sneezing, coughing, talking and even simple breathing. Larger infectious agents are transmitted via large, heavy drops of mucous (droplets) and can travel ~ 3 feet (91cm) from the infected person. Smaller infectious agents (<5 microns in size) can attach to dust particles and become airborne, travelling extreme distances via air currents.
5. Trans-placental

   Trans-placental infections are those that are transmitted from the mother to her embryo or foetus via the placenta. The mother acts as the reservoir and the embryo is the susceptible host.

**Portal of entry**

Infectious agents gain entry into the host either through openings in the skin (e.g. cuts), or via mucous membranes lining the wall of the respiratory, gastrointestinal and genitourinary tracts. Infectious agents access the respiratory tract via the eyes, nose and mouth.

**Susceptible host**

In order to cause disease in the new host, this host must be susceptible to the disease. For example, the host can be naturally immune to the infectious agent, or be rendered immune via vaccination.

- Babies are vulnerable to infection because it takes a few months for their immune system to fully develop.
- As people age their immune systems change, so the elderly may fight infection less quickly and less effectively.

## 3.2. IPC Principles

Infection prevention and control strategies within healthcare are designed to break the chain of infection. These interventions are often targeted at specific links of the transmission chain.

The basic set of IPC strategies that should be implemented in healthcare facilities (HCFs) at all times are known as “standard precautions.” These evidence-based practices are designed to protect HCWs and also prevent transmission of infections among patients. Standard precautions include hand hygiene, use of personal protective equipment, practising appropriate respiratory hygiene, safe use and disposal of sharps, appropriate decontamination of medical equipment, laundry and environment and waste management. For certain infectious diseases e.g. those considered highly transmissible and/or caused by epidemiologically important pathogens. An additional set of IPC interventions known as “transmission based precautions” are implemented to prevent the spread of the disease. These interventions are specific to the mode of transmission of the disease. Contact precautions are implemented to prevent transmission of diseases that are spread via contact with infectious material. Droplet precautions are used to prevent transmission of diseases that are spread via contaminated respiratory droplets. Airborne precautions are implemented to prevent transmission of diseases that can spread through aerosolized particles.

## 3.3. Common and Important HAI

The healthcare environment includes people, instruments, equipment, and surfaces such as floors and furniture. The environment also includes waste disposal and water supply. Cleanliness of this environment can help to make the health care facility a safe and comfortable place for the patient. In addition, proper care of the hospital environment can prevent HAI infection.

A HAI is one that the patient did not have when he or she was admitted to the healthcare service. For example, a patient may come to the hospital to have an operation. After the operation, the patient's surgical wound begins to produce pus or other signs and symptoms of infection. This infection is a HAI, because there was no infection before the operation. Other types of nosocomial infections include urinary tract infection, pneumonia, bloodstream infection (septicaemia), gastro-intestinal and skin infections.

Healthcare associated infections also occur in HCW, relatives and visitors who have close contact with patients or with patients' body fluids, such as blood, vaginal secretions, urine and faeces. For example, a patient's blood may be infected with HIV and a HCW may get HIV infection if he or she is injured with a needle, which has just been used on an HIV-infected patient.

Preventing HAI is important because they:

- result in pain, discomfort and even death
- increase the time the patient has to stay in hospital
- keep the patient from working
- are expensive because money is required for medicines and equipment.

Healthcare associated infections can be classified as either endogenous (also known as self-infection) or exogenous (also known as cross-infection) infections. Infection prevention and control interventions differ between the two categories.

**Endogenous infection**

Many microorganisms that cause HAIs come from the patient's own body (the term Normal flora/endogenous flora is used to describe this). For example, bacteria normally present in the colon can gain entry to the urinary tract and cause urinary tract infections. Endogenous infections are difficult to prevent by conventional measures since the microorganism causing the infection comes directly from the patient. However, they can be controlled by helping to protect the resistance of the person to infection (e.g. mobilising the patient, providing adequate nutrition, or avoiding the use of urinary catheters and intravenous catheters if possible, promoting patient hand hygiene after defecation and before eating and before touching wounds/skin breaks).

**Exogenous infection**

Exogenous infection is a result from the transfer of microorganisms to the patient or HCW from an external reservoir. For example, microorganisms can be transferred through direct contact with contaminated hands of HCWs and other patients (cross-contamination), contaminated instruments and needles, or the environment greatly reduce the frequency of cross contamination between patients and HCWs and thus reduce the incidence of infection. As with endogenous infection, measures to protect a person's natural resistance to infection can also help to reduce the likelihood of infection if cross transmission does occur.

Infection prevention and control is important in HCFs because on-going cross transmission can result in certain types of microorganisms becoming established (resident) in the HCF with the potential for antimicrobial resistance to occur.

There are four major types of HAI, all related to invasive or surgical procedures: urinary tract infection (UTI), surgical-site infection (SSI), healthcare associated pneumonia (HAP), and blood stream infection (BSI). This chapter provides background information and prevention advice on those four and in addition a number of other significant or common infections that may be transmitted in a HCF.

For all of the HAIs addressed in this chapter the following preconditions for prevention should be addressed by HCF leaders and managers, informed by the evidence based information provided:

1. Infrastructure/system change: access to the right equipment, supplies and ban environment that facilitates the right actions for patient and health worker safety
2. Training and education: a program of routine training and education for all relevant HCWs that is in line with the recommendations presented in this chapter
3. Monitoring, evaluation and feedback: a program of regular monitoring and feedback is in place
4. Awareness raising/promotion: the practices described in the chapter are reinforced through awareness raising such as use of posters referenced in the chapter, displayed at the point of care
5. Safety culture: managers and leaders at every level of the HCF show their visible support for IPC to help develop and reinforce a culture of patient safety

### 3.3.1. Urinary tract infection (UTI)

Urinary tract infection is one of the most common HAIs. Preventing UTI is a major factor in decreasing the overall incidence of HAIs in HCFs. Healthcare-associated UTIs are frequently related to urinary catheterization. Many patients with a urinary catheter develop bacteriuria (bacteria in the urine) because the catheter creates a pathway for bacteria to enter the bladder. However, it is important to make the distinction between bacteriuria and an actual urinary tract infection. Patients should not be considered to have a catheter related urinary tract infection and should not receive antimicrobial treatment solely because the urine is discoloured, has an odour, or because the laboratory has cultured bacteria from the urine. Unless the patient has clinical features of infection (e.g. fever, rigors, other systemic features) they should not be considered to have catheter related UTI. See Appendix 3 for hand hygiene "Focus on caring for a patient with a urinary catheter".

Factors that can lead to bacteriuria and may lead to UTIs include:

- Urinary catheterization which creates a pathway that allows for endogenous transfer of microorganisms (e.g. bacteria from the patient's GI tract can be transmitted to the urinary tract)
- Passage of organisms from the urine bag to the bladder (retrograde contamination) can occur in patients with indwelling catheters
- Some microorganisms that can grow on the outside or inside of the catheter's tubing and in the urine itself
- Handling of the urinary catheter and urine bag by HCWs

Reducing healthcare associated UTI:

- Introducing an indwelling urinary catheter should be done only when necessary and no other options are effective. It is particularly important to limit the duration of catheterization as much as possible
- Following appropriate procedures for inserting and removing urinary catheters will also reduce the risk of UTI
- Consider other methods for managing urinary tract problems that do not require the use of an indwelling catheter
- Ensure that only properly trained persons insert and maintain catheters
- Minimise the duration of catheterisation

*Insertion procedure for urinary catheter:*

- Explain the procedure to the patient and get his / her consent
- It is recommended that during the procedure an assistant is available
- Before inserting a urinary catheter, all of the following materials should be available at the point of care: a sterile indwelling urinary catheter, a sterile drape, a sterile syringe filled with sterile water for blowing up the balloon, clean examination gloves, sterile gloves, antiseptic solution (2 % aqueous chlorhexidine gluconate or 10 % povidone-iodine), a sterile gauze or sponge-holding forceps, and a single use lubricant
- Lubricant is not really necessary; in case you decide to used be sure is single use
- Practice aseptic non touch technique (ANTT)
- Perform hand hygiene and put on clean examination gloves
- Clean with soap and water and rinse the urethral area and external genitals carefully and thoroughly
- Separate and hold the labia apart or hold the head of penis with the non-dominant hand and prepare the urethral area with the antiseptic solution using an sterile gauze or an sponge forceps with sterile gauze
- Perform hand hygiene and put on a pair of sterile gloves
- Grasp the catheter about 5 centimetres from the catheter tip with the dominant hand and place the other end in the urine collection bag
- Gently insert the catheter until urine flows then for a further 5 cm. Inflate the balloon. Record the volume required to inflate the balloon, the same volume should be removed when the balloon is deflated for removal
- Do not use undue force. In the event of pain, blood or resistance during insertion stop the procedure
- If the catheter is indwelling, pull it out gently to feel resistance, and secure the indwelling catheter properly to the thigh. For in and out catheterization, allow the urine to slowly drain into the collection bag, then gently remove the catheter
- Dispose of waste appropriately
- Remove gloves and practice hand hygiene

*Removal procedure for urinary catheter:*

- Indwelling urinary catheters should be removed as soon as possible to reduce the risk of UTI
- Before removing the catheter, ensure that a new pair of clean examination gloves, a syringe is in the point of care
- Practice hand hygiene Put on clean examination gloves
- Empty the catheter balloon using a syringe, compare the volume removed to that inserted, it should be the same
- Swab the urethra two times with an antiseptic solution using sponge forceps with sterile gauze
- Gently remove the catheter
- Dispose of all waste appropriately
- Remove gloves and practice hand hygiene

*Catheter maintenance:*

- Daily cleaning of the peri-urethral area
- Do not rest the bag on the floor
- Urine flow through the catheter should be checked several times a day to ensure that the catheter is not blocked (no dependent loops or kinking of the catheter tubing)
- Avoid raising the collection bag above the level of the bladder. If it becomes necessary to raise the bag above the level of the patient's bladder during transfer of the patient to a bed or stretcher, clamp the tubing
- Before the patient stands up, drain all urine from the tubing into the bag
- Remove the urine after performing hand hygiene and while wearing clean examination gloves
- To avoid contamination, the collection bag should be emptied in a clean fresh vessel, do not permit the tip touch the urine vessel
- For samples collection aspirate the urine from the needleless sampling port with a sterile needle
- Unless obstruction is anticipate bladder irrigation is not recommended
- The catheter collection closed system should remain always closed. Unless absolutely necessary open systems can be open
- In open system replace bags when needed
- Clamping catheters prior to removal is not necessary
- Daily review of urinary catheter necessity and remove as soon as indicated preferably within 24 hours

### 3.3.2. Surgical site infection (SSI)

Surgical site infections are often the result of contamination during the surgical procedure or contamination of the surgical wound after the procedure. SSIs are very common HAIs and often require additional surgical procedures to treat the infection.

The following factors predispose a patient to development of a SSI:

- Obesity
- Infection at another body site at the time of surgery
- Immunosuppression
- Malnutrition and anaemia
- Old age and chronic diseases such as diabetes and malignancy

*Reducing SSI risk for patients:*

- Avoid prolonged preoperative hospitalization and recommend ambulatory surgery as often as possible
- Avoid preoperative hair removal. If hair must be removed, clip it with scissors or electric clippers just before the surgery. Do not shave using a razor blade (shaving has been attributed to microscopic cuts in the skin that later serve as foci for bacterial multiplication)
- In the surgical room prepare a wide area around the proposed incision site with antiseptic solution (2% alcohol chlorhexidine is generally appropriate)
- Practice good surgical techniques that minimize tissue trauma, control bleeding, eliminate dead space, use minimal sutures, and maintain adequate blood supply and oxygenation
- Keep the duration of surgical procedures as short as possible. The rate of infection doubles with each hour of surgery
- Discharge patients promptly after surgery

It is important to note that applying topical antibiotic ointments on closed skin incisions does not decrease the risk of SSI. Additionally, healthy tissue growth is damaged when dry gauze is removed from surgical wounds. Moisten the dry gauze with sterile normal saline solution before removing it

*Antimicrobial prophylaxis to reduce risk of SSI:*

- The administration of systemic antimicrobial agents immediately before surgery can reduce the incidence of SSI after certain operations. The benefits, however, must be weighed against the risks of toxic and allergic reactions, the emergence of resistant bacteria, drug interactions, super infection, and cost. In general, antimicrobial prophylaxis is recommended for procedures with significant risk of infection (for example, surgery that involves entering the colon). The prophylactic antimicrobial drug(s) should be directed against the most likely infecting organisms.
- To help reduce the development of antimicrobial resistance to drugs used for surgical prophylaxis, it is recommended that:
    - Antimicrobial agents with a moderately long half-life should be used
    - Antimicrobial agents with an appropriate spectrum of activity should be used
    - The antimicrobial agent(s) used prophylactically differ from any agents used for a period of time just before surgery, as anti-microbial-resistant bacteria may have developed
    - Selection of antimicrobial agent(s) for surgical prophylaxis should take account of local/national data on antimicrobial resistance where this is available
- Each HCF should have a clear written policy of antimicrobial prophylaxis in surgery that specifies for which types of surgery and which patient categories antimicrobial prophylaxis is required, the agent(s) to be used, the dose, the route of administration, the interval before surgery and an alternative regimen for patients with a history of adverse reaction to the primary regimen
- Agents commonly used for abdominal surgery are co-amoxiclav (amoxicillin/clavulanic acid), the combination of cefotaxime and metronidazole, or for those with a history of immediate hypersensitivity to beta-lactam antimicrobial agents, the combination of ciprofloxacin and metronidazole. All of these agents are included in the WHO Model List of Essential Medicines 17th List (2011) available at http://whqlibdoc.who.int/hq/2011/a95053_eng.pdf
- In most instances, a single IV dose of an antimicrobial administered 60 minutes or less before the skin incision provides adequate levels of antimicrobial within the tissues throughout the operation. If surgery is prolonged (more than four hours), if major blood loss occurs, or if an antimicrobial with a short half-life is used, one or more additional doses should be given during the procedure
- Use the WHO Surgical Safety Checklist (Appendix 4)

### 3.3.3. Healthcare associated pneumonia (HAP)

Healthcare associated pneumonia (HAP) is a common HAI with a significant risk of a fatal outcome. Most of these infections occur by aspiration of bacteria growing in the back of the throat or in the stomach. Pneumonia associated with mechanical ventilation may be referred to as ventilator associated pneumonia (VAP). The range of microorganisms associated with HAP/VAP is much wider than is the case for community acquired pneumonia (CAP) and many of these microorganisms are much more likely to be resistant to antimicrobials. Therefore HAP/VAP may be much harder to treat effectively with antimicrobial agents than CAP.

Intubation and mechanical ventilation greatly increase the risk of pneumonia in the following ways:

- They block the normal body defence mechanisms—coughing, sneezing, and the gag reflex
- They prevent the washing action of the cilia and mucus-secreting cells that line the upper respiratory system
- They provide a direct pathway for microorganisms to get into the lungs

Other procedures that could increase the risk of pneumonia include oxygen therapy, intermittent positive pressure ventilation (IPPV) treatment, and endotracheal suctioning. The combination of severe illness, the presence of multiple invasive devices (intravenous catheters, urinary catheters, and mechanical ventilators), and frequent contact with the hands of HCWs often leads to cross-contamination and patient infection. See Appendix 5 for hand hygiene “Focus on caring for a patient with an endotracheal tube”.

Risk factors for HAP:

- Old age (over 70)
- Chronic lung disease
- Severe head injuries with loss of consciousness
- Severe medical conditions, such as end-stage renal disease and liver cirrhosis
- Cigarette smoking
- Alcoholism
- Obesity
- Major cardiovascular or pulmonary surgery
- Endotracheal intubation and mechanical ventilation
- Prolonged confinement to bed
- Immune deficiency states
- Diabetes

*Reducing the risk of HAP – Preoperative pulmonary care*

- Limit the use of narcotics although not to a degree that will compromise appropriate pain relief
- Adhere to standard precautions to maximize prevention of cross-transmission of microorganisms
- Additionally, patients should be educated about the following postoperative practices that can prevent development of healthcare-associated pneumonia:
  - Deep breathing
  - Moving in bed
  - Frequent coughing
- Early ambulation

*Reducing the risk of HAP – Prevention of complications from equipment/devices*

To reduce the risk of contamination and possible infection from mechanical respirators and other equipment follow these guidelines:

- Use mechanical ventilation only when necessary
- Implement a comprehensive oropharyngeal cleaning this includes suctioning to avoid draining past the tube and consider decontamination program for all patients at high risk for VAP
- If reusable breathing circuits are used, they must be cleaned and appropriately sterilized between patients according to the manufacturer's guidance. Disposable (single patient use) breathing circuits eliminate this risk of cross-transmission but are expensive.
- Breathing circuits intended for single patient use are not suitable for cleaning, decontamination and reuse
- Respiratory equipment such as oxygen tubing, nasal prongs, nebulisers, masks are intended for single patient use and are not suitable for cleaning, decontamination and reuse
- Disinfect or sterilize resuscitation devices, such as Ambu bags, promptly according to the manufacturer's guidelines

To minimise cross-contamination when suctioning patients on ventilators, follow these guidelines:

- Practice hand hygiene
- Wear sterile examination gloves, a mask, and protective eyewear
- Use only sterile fluid to clear a catheter that you're using to suction secretions from the patient's lower respiratory tract if you are planning to reinsert it into the ET tube
- Discard waste appropriately
- Decontaminate and clean suction catheters and then disinfect them with high-level steam
- Remove gloves immediately after therapy and practice hand hygiene

*Reducing the risk of HAP – Preventing gastric reflux*

Follow these practices to reduce the risk of gastric reflux, which can lead to HAP:

- Avoid prolonged use of nasal gastric tubes for feeding
- Feed small, frequent amounts rather than large amounts at one time
- Elevate the head (30-45 degrees), if not contraindicated so that the patient is in a semi sitting position
- Ensure patients stop taking solid foods 4-6 hours prior to general anaesthetic

*Reducing the risk of HAP – Post-operative management*
Surgical units should have effective plans for post-operative management that include the following the guidelines:

- Provide adequate pain control for patient comfort and to facilitate movement and encourage deep
- breathing/coughing
- Move and exercise patients daily to prevent skin breakdown and pressure sores
- Encourage deep breathing/coughing in the immediate postoperative period and for the next few days
- Encourage early mobilization of patients
- Ensure adequate nutrition

### 3.3.4 Infections related to use of intravascular devices

Intravascular devices inserted into the venous or arterial bloodstream penetrate the normal skin defence mechanism and provide a route for microorganisms to enter the bloodstream from one or more of the following:

- Any contamination of the device at the time of insertion
- Subsequent contamination of the device or attachments
- Pathogens on the skin surrounding the insertion site

Intravascular device related infection may be localised skin and soft tissue infection at the site of the intravascular device (exit site infection, phlebitis). Localised infection is typically associated with Staphylococcus aureus. The infection may extend to cause extensive skin and soft tissue infection of the limb and can progress to bloodstream infection. Intravascular devices may also be associated with bloodstream infection with little or no evidence of infection at the catheter site. Staphylococcus aureus is again the most common associated organism. For these reasons intravascular catheter related infection should be considered in any patient who develops a new onset blood stream infection with an intravascular device in situ, particularly if there is no other obvious site of infection (e.g. pneumonia). Where available a sample for blood culture should be taken using appropriate precautions to aid in diagnosis of patients with suspected severe intravascular catheter related infection. One of the most important principles of safe management of intravascular catheter related infection is early removal of the catheter. Antimicrobial treatment is unlikely to be effective if the catheter remains in place.

Risk factors associated with infections related to the use of intravascular catheters:

- Inadequate adherence to hand hygiene during insertion and care of the device
- Immunosuppression
- Cracks in infusion bottles and punctures in plastic containers, allowing for contamination of substance being infused
- Contaminated infusion fluid or additives
- Leaky intravenous administration sets with multiple connections
- Non sterile preparation of intravenous infusion fluid
- Non sterile preparation of skin before inserting the device
- Multiple changes of intravenous fluid containers while using the same IV administration set
- Multiple injections and irrigations of the system
- Central venous pressure measurement apparatus

*Reducing the risk of HAI due to intravascular catheters*
The following practices should help reduce the risk of infection and see Appendix 6 and 7 “Focus on caring for a patient with a central venous catheter” and “Focus on caring for a patient with a peripheral venous catheter”:

- Avoid intravascular catheterisation when possible
- Practice hand hygiene and put on clean sterile gloves when inserting and handling intravenous catheters
- If the site for inserting the catheter is dirty, wash it with soap and clean water and dry it before applying the skin antiseptic
- Allow the skin antiseptic solution to dry after applying before inserting the intravascular catheter
- Follow Aseptic Non Touch Technique (ANTT) in insertion and care of intravascular lines

- the device in place by attachment to the skin. Ideally use transparent, adherent dressings to allow easy inspection of the site later
- Dressings can be left in place for up to 72 hours if they are kept dry. Change the dressing immediately if it be-comes wet, soiled, or loose
- If dressings are removed to inspect the site discard the removed dressing appropriately and use a new dressing
- If there is resistance to withdrawal of blood or injection of drugs through an intravascular catheter do not use force. The catheter is likely to need replacement
- Check at least daily if the patient has pain or discomfort at the site of the intravenous line. If palpating the cannula site daily for tenderness be careful to practice hand hygiene, wear sterile gloves and avoid touching the puncture site. Inspect the insertion site if the patient develops tenderness or fever
- For peripheral IV lines avoid using the lower limbs if possible as these are more likely to become infected
- Routine change of intravascular catheters after 72 hours is not necessary provided that there is no evidence of infection and there is no resistance to injection or fluid administration
- Because straight and butterfly needles frequently infiltrate, do not use them with solutions that could cause tissue necrosis

For inserting central venous catheters:

- Avoid use of central venous catheter unless it is essential
- Avoid using the femoral or jugular sites for adults (if possible)
- Central venous catheters should only be inserted by those with substantial experience in the procedure or by those in training under direct supervision of a person with substantial experience. Infection is more likely if inexperienced HCWs insert the catheter
- Wash the catheter insertion site with soap and clean water and dry it before applying the skin antiseptic
- Prepare the skin using alcoholic 2 % chlorhexidine gluconate or 60 % to 90 % alcohol and allow to dry
- Perform hand hygiene and use ANTT/maximal sterile barrier precautions (i.e., surgical mask, cap, gown, sterile gloves) and sterile full body drape on the patient
- Put on sterile gloves, face shield and gown before inserting central venous catheter
- Handle and maintain central lines appropriately
- Comply with hand hygiene requirements
- Scrub the access port or hub immediately prior to each use with an appropriate antiseptic (e.g., alcoholic chlorhexidine, povidone iodine, an iodophor, or 70% alcohol)
- Access catheters only with sterile devices
- Replace dressings that are wet, soiled, or dislodged
- Perform dressing changes under aseptic technique using clean or sterile gloves

*Changing fluids and infusion sets*

Follow these guidelines for changing fluids and infusion sets:

- Change infusion bottles or plastic bags with parenteral solutions every 24 hours
- Change infusion bottles or plastic bags with lipid emulsion given alone within 12 hours
- Change infusion sets whenever they are damaged/contaminated and after 96 hours routinely
- If the tubing becomes disconnected, wipe the hub of the cannula with 60 % to 90 % alcohol and connect a new infusion set
- Replace tubing that is used to administer blood products or lipid emulsions within 24 hours

*Inserting and maintaining peripheral IV lines*

Follow these practices to reduce the risk of infection when inserting and maintaining peripheral intravascular catheters:

- Avoid use of intravascular catheters unless essential. Consider the use of oral re-hydration fluid to replace fluids unless the patient is severely dehydrated or vomiting.
- Practice hand hygiene and wear sterile single-use examination gloves
- Cleanse the insertion site with antiseptic solution using a circular motion outward from the insertion site (or follow manufacture's recommendation for cleansing site) and allow the antiseptic solution to dry

*Removal of peripheral IV lines*

Follow these practices to reduce the risk of infection when removing peripheral IV lines:

- Practice hand hygiene

- Put on sterile examination gloves
- Check the patient's hand or wrist for phlebitis or evidence of infection. If phlebitis is associated with other signs of infection, such as fever or pus coming from the exit site, this is classified as a clinical exit-site infection
- Carefully remove the needle or the plastic catheter with one hand and with the other hand cover the insertion site with sterile gauze
- Press the insertion site firmly for about a minute and cover it with a sterile bandage
- Dispose of waste appropriately, remove gloves, and practice hand hygiene
- If clinical exit site infection is present, assess whether or not it requires antimicrobial treatment
- Document clinical observations of IV site (ex. Intact without signs/symptoms of infection, warm, erythema, pus etc) in patient record

## 3.4. Common pathogens responsible for HAI

### 3.4.1. Healthcare associated diarrhoea

Diarrhoea is generally defined as passage of three or more liquid stools in 24 hours. In some cases, however the abrupt onset of illness with passage of a single liquid stool leaves little doubt that the patient will meet the definition of diarrhoea soon afterwards and it is sensible to consider that the patient has diarrhoea.

New onset passage of loose stool in patients admitted to HCF is common. It is not always caused by infection although this should be considered as likely in most cases.

Causes of food and water borne infectious diarrhoea which are important in the community (rotavirus, campylobacter, salmonella, cholera) can also be introduced into a HCF by patients and staff if the water supply is not safe; if food is not properly prepared, stored and served; if infected staff come to work while they have diarrhoea; or if infected people visit relatives. Once introduced to the hospital, diarrhoeal infection may be spread through person-to-person transmission.

Factors that put patients at particular risk for healthcare associated diarrhoea include the following:

- Antimicrobial administration (especially for C. difficile associated diarrhoea)
- Sharing space with a patient who has infectious diarrhoea
- Occupying space previously occupied by a patient with infectious diarrhoea
- Immunosuppression
- Decreased gastric acidity (for example in patients taking drugs to suppress gastric acid)
- Unhygienic shared toilet facilities
- Inadequate hand hygiene by patients and staff at the correct moments

Prevention of healthcare associated diarrhoea can be achieved by:

- Practice appropriate hand hygiene
- Single room isolation, cohorting in a separate space or keeping distance between patients should be practiced for all patients with diarrhoea even if the diarrhoea is considered to be non-infectious. This is because patients with diarrhoea are highly likely to contaminate their environment with their colonic bacteria. These bacteria may include antimicrobial resistant bacteria that could cause infection in other vulnerable patients
- Ensure that all patients admitted with diarrhoea or who develop diarrhoea in the HCF are kept in separate space and use separate washing and toilet facilities if at all possible (i.e. isolation)
- If a separate space is not possible, consider how to help the patients with diarrhoea keep some distance from other patients
- Immediately clean and then disinfect all soiled articles and environment
- Ensure that bedpans and bathroom equipment that are regularly handled by patients and staff are clean at all times and disinfected when appropriate
- Wear utility or heavy-duty gloves before sorting out linen, and bundle soiled linen to prevent leakage
- Ensure that staff with diarrhoea are not engaged in patient care or food preparation and serving until at least 24 hours after diarrhoea has resolved

### 3.4.2. Blood borne pathogens

Blood-borne transmission of viral infection is a recognised risk to both healthcare workers and the patients in their care. In health care, transmission of blood-borne viruses may occur by injection, infusion, transplantation, unsterile equipment, or other accidental injury/penetration. The risk of transmission of

infections can be reduced by eliminating hazards, providing and using engineering controls, avoiding unsafe practices, using personal protective equipment, immunisation, and post-exposure prophylaxis.

Hepatitis B virus (HBV), Hepatitis C virus (HCV) and HIV virus are important blood-borne pathogens that can be transmitted in the health care setting through administration of blood and blood products, use of contaminated needles or sharps injuries.

### 3.4.3. Tuberculosis

Tuberculosis (TB) is a bacterial infection caused mainly by the species *Mycobacterium tuberculosis*. Transmission is through the airborne route when someone with active disease (untreated smear-positive) coughs, talks, sneezes, or spits. The bacteria can then be inhaled into the lung by people nearby. Only patients who develop lung disease generate the aerosols that allow for airborne spread of TB. Patients with TB at sites other than the lung (e.g. bone or kidney) generally do not transmit infection. Tuberculosis is usually identified by laboratory examination of a sputum sample.

Follow these procedures for patients who are suspected of having TB:

- Initial evaluation and testing is best done on an outpatient basis if possible
- Collect a sample of sputum for smear examination as a matter of urgency. Where available rapid molecular testing may be preferred
- Disposable, non-transparent sputum cups with lids should be used for sample collection
- Perform a chest X-ray to aid diagnosis when available
- Initiation of effective treatment rapidly reduces the risk of infection from infected patients
- All HCFs should be assessed to identify areas where TB transmission can occur
- Adequacy of airflow and natural light should be determined
- In areas where airflow by cross-ventilation is inadequate, extractor fans should be installed
- Natural light should be increased where necessary
- Patients who are coughing in the outpatient clinic or emergency department should wait outside if possible, or in a well-ventilated area. Signs reminding patients about respiratory hygiene precautions, such as the use of tissues when coughing should be displayed prominently
- Patients suspected of having TB should be examined in a well-ventilated area
- The patient should wear a surgical mask if possible
- HCWs treating patients with TB should wear a mask, ideally a fitted respiratory protection mask. Work in the patient area should be planned so as to be performed as efficiently as possible to limit time spent there
- If a patient who is suspected of having TB is admitted to an inpatient ward, they should be placed in either a separate, well-lit, and well-ventilated room or with additional patients suspected of having TB in a cohort area of the ward
- Patients with multi-drug resistant (MDR) or extensively drug resistant (XDR) TB should be nursed in isolation
- The sputum smear result/molecular test result should be returned to HCWs on the inpatient ward within 24 hours so that the patient can be treated as soon as possible
- Supplies of respiratory protection (N95 or equivalent) masks may be limited. If so, they should be conserved for high-risk situations such as when performing or assisting with bronchoscopy, endotracheal intubation, suctioning, or autopsy of TB cases
- When the patient needs to move within the hospital, he or she should wear a mask. Inform staff in the area or ward to which the patient is taken or transferred so that they can implement effective IPC measures

- For patients on TB treatment, delay any operative procedures until the patient is no longer infectious if it is safe to do so [TB-infected patients who have received adequate treatment for 2 to 3 weeks, have responded to the treatment, and have had three consecutive negative smear examinations from sputum taken on 3 separate days are no longer infectious]. It will take about 2 months for most infectious TB patients to become non-infectious This is more complex however in situations where MDR and XDR TB are common, as standard initial therapy is generally ineffective for these patients
- If emergency surgery is required, it should be planned to minimise risk of occupational exposure. Numbers of HCWs in the operating room should be minimised and respiratory protection masks should be worn as appropriate

- Every patient that is confirmed to have TB via laboratory smear should be informed of their positive result
- It is a public health requirement under the National Public Health Act that diagnosed cases of every form of TB should be reported to the Ministry of Health using the relevant TB notification form(s)
- Contact tracing for screening should be performed and the patient should be monitored to ensure full compliance with treatment

# Chapter 4: STANDARD PRECAUTIONS AND TRANSMISSION BASED PRECAUTIONS

## 4.1. Standard Precautions

It is essential that all HCW's apply standard precautions at all times to protect themselves and patients because:

- People may be infectious before they show signs and symptoms or laboratory test confirmation
- There is an increased risk of transmission of infection with specific procedures
- People are at risk of acquiring infectious agents present in the environmental surroundings including surfaces or from equipment

Standard precautions should be used for all patients, regardless of their diagnosis or presumed infection status and is used in handling all blood including dried blood, all body fluids, secretions and excretions (excluding sweat) regardless of whether or not they contain visible blood, non-intact skin and mucous membranes.

Standard precautions involve safe work practices and include the following:

- Hand hygiene
- Respiratory hygiene/cough etiquette
- Personal protective equipment (PPE)
- Safe use and disposal of sharps
- Routine environmental cleaning
- Appropriate handling of laundry
- Healthcare waste management
- Reprocessing of reusable medical equipment and instruments

## 4.2. Hand hygiene

The most common mode of transmission of any infectious agents is via the hands of staff and patients. Bacteria are present on the hands most of the time and are categorised into two, namely the:

- **Resident flora** - resides on the surface of the skin and
- **Transient flora** - acquired from the HCW's during contact with patients and contaminated environmental surfaces within the patient surrounding. The transient organism survives and multiplies on the skins surface and can easily be removed by frequent hand hygiene. Transient organisms are most often associated with HAI's.

Several studies have highlighted that HCW's hands contaminated with transient organisms have been responsible for outbreaks of MRSA and other multi-resistant gram negative organisms in the neonatal intensive care unit and adult intensive care units. In addition, hands can be contaminated with the Influenza virus through contact with secretions and contaminated environmental surfaces and can lead to cross infection.

### 4.2.1. Indications for hand hygiene (HH)

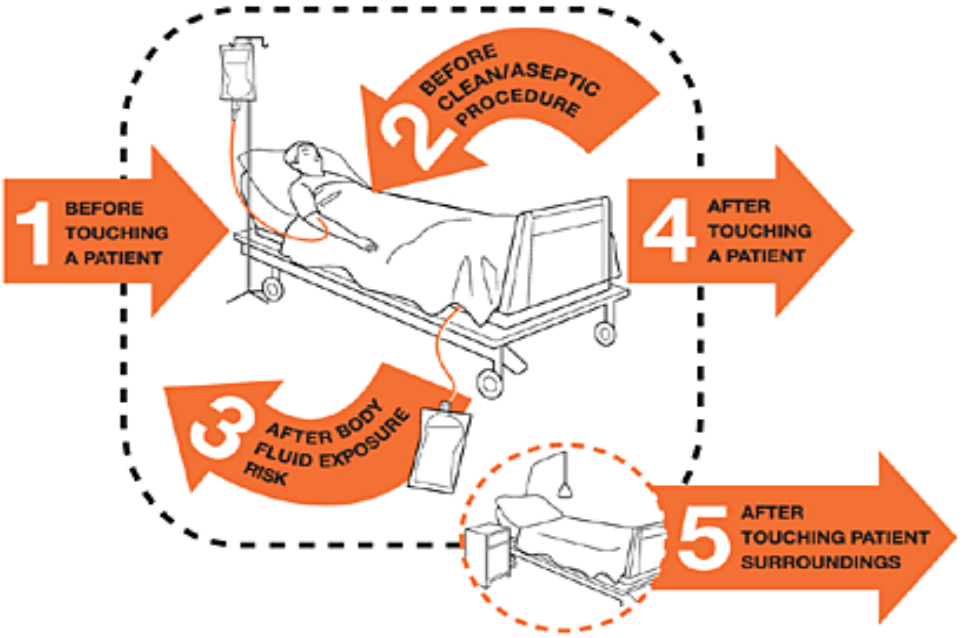
Hand hygiene (HH) is mandatory and is the single most important measure to prevent and minimise the spread of infection within hospital environments.

The main purpose of hand hygiene is to prevent the spread of infection by removing visible soil and micro-organisms (transient microorganisms) carried on the hands of both staff and patients, and includes both hand washing with soap or antimicrobial soap and water, and alcohol-based hand rub (ABHR) products (gels, rinses, foams) that do not require the use of water.

To ensure proper hand hygiene, soap must be rubbed on all surfaces of both hands followed by rinsing with running water and drying by a single use hand towel or cloth, or ABHR is applied to all surfaces of the hands.

The five (5) moments for Hand Hygiene (Figure 1) developed by the World Health Organisation is strongly recommended in clinical settings and is applicable to all healthcare facilities including general and primary health care.

Figure 1: The Five (5) moments for Hand Hygiene




**Note:** HH should also be done before and after removal of gloves.

Other Examples of when to perform hand hygiene

- Before and after eating or preparing to serve or handle food.
- Before administering medications to a patient
- When hands become visibly soiled
- After using the toilet
- After removing gloves
- Before and after leaving work
- Before and after using computer keyboards especially in the clinical environment
- After wiping mouth and nose secretions
- Entering and when leaving the patient environment especially during an outbreak of an infectious agent
- After handling laundry and equipment

A culture of hand hygiene should be encouraged not only among healthcare staff
but also in patients and visitors to a facility and the general community at large.

Compliance with hand hygiene is usually sub-optimal. Reasons for poor compliance include:

- lack of appropriate equipment
- low staff to patient ratios
- allergies to hand hygiene products
- insufficient knowledge among staff of risks and procedures
- time required
- casual attitude among staff towards infection control

**Note:** HCW's must maintain short clean finger nails and must not wear nail polish or artificial nails when at work.

## 4.2.2. Hand hygiene products

Hand hygiene includes both hand washing with soap or antimicrobial soap and water, and the use of alcohol-based hand rub products (gels, rinses, foams) that do not require the use of water. Water alone is not suitable for cleaning soiled hands, soap must be used with water for effective hand washing.

Hand drying is an essential part of hand washing. Ideally hands should be dried with a single use paper towel or cloth towel that are able to dry hands as quickly as paper towels. The reuse of cloth hand towels should be avoided because of the risk of cross contamination.

*Alcohol-based hand rubs*

According to the WHO ABHR preparations contain either ethanol, isopropanol or the combination of two of these products (60% v/v n-propanol is approximately equivalent to 70% v/v isopropanol and to 80% v/v ethanol). Most studies have highlighted that an alcohol based hand rub preparation of at least 70% isopropanol, 0.5% chlorohexidine and a skin emollient is effective against HAI's.

The efficacy of alcohol based hand rub depends on appropriate usage which includes:

- Type of alcohol used
- Whether hands were wet when alcohol was used (hands should be dry before use of ABHR)
- Volume of alcohol used. (ideal volume is unknown, however if hands dry before 10 -15 seconds after being rubbed then it is likely that insufficient volume of alcohol was used
- Hands that are visibly soiled (if hands are visibly soiled, wash first with soap and water)

*Local Production of ABHR*

Alcohol-based hand rubs can easily be prepared locally by a hospital pharmacy and is suitable for use in low-and middle-income countries or remote areas where there is a lack of sinks and other HH needs like hand towels, liquid soap and clean running water. ABHR is highly effective and inactivates a wide range of harmful microorganisms on the hands.

WHO recommendation of two (2) formulations for local production:

**Formulation 1**

To produce **final concentrations** for ethanol 80% v/v, glycerol 1.45% and hydrogen peroxide ($H^2$ $O^2$) 0.125% v/v.

Pour into a 1000ml graduated flask:

a. ethanol 96% v/v – 833.3ml
b. $H^2$ $O^2$ 3% v/v – 41.7 ml
c. glycerol 98% - 14.5 ml

Top up flask to 1000ml with distilled or cool boiled water and shake gently to mix contents.

**Formulation 2**

To produce **final concentrations** for isopropyl alcohol 75% v/v, glycerol 1.45% and hydrogen peroxide ($H^2$ $O^2$) 0.125% v/v.

Pour into a 1000ml graduated flask:

a. isopropyl alcohol (with a purity 99.8 % – 751.5ml
b. $H^2$ $O^2$ 3% v/v – 41.7 ml
c. glycerol 98% - 14.5 ml

Top up flask to 1000ml with distilled or cool boiled water and shake gently to mix contents.

**Note:**

- Hydrogen peroxide is added to eliminate contaminating spores in the bulk solution.
- Glycerol is a humectant or emollient added for (skin care) to increase the acceptability of use.
- Bottles should be labelled to include:
  - Date of manufacture
  - Composition: ethanol, glycerol, and hydrogen peroxide
  - WHO recommended hand rub formulation
  - For external use only

- Avoid contact with eyes
- Keep out of reach from children
- Use: apply a small amount of ABHR and cover all the surfaces of the hands, rub until dry.
- Keep away from flame and heat.

*Soap and water*

Soaps are more commonly available in the form of being bar soaps and liquid cakes, the use of plain soap preparations and water act by removing microorganisms but have no antimicrobial activity. If bar soaps are used, it is important to ensure that it placed on a well-drained holder and should not be immersed in liquid. It is preferable to use liquid soap preparations.

Hand hygiene with plain soap and water is indicated for removing certain organisms like *C. difficile and non-enveloped viruses* such as norovirus. Alcohol-based hand rub is effective at removing vegetative forms of *C. difficile* but is not effective at removing spores.

Soap and water can still be used even where there is no piped water. If piped water is not available, you use one of the following methods:

1. A bucket with a tap at the base
2. A pitcher or a jug to pour water over hands with the help of an assistant

### 4.2.3. Hand hygiene techniques

*There are three (3) types of hand hygiene techniques*

- *Social or routine hand wash*
- *Aseptic or clinical hand wash*
- *Surgical*

*Social or routine HH*

Hands and wrists are washed for 40–60 seconds *with plain liquid or bar soap to remove dirt, soil and other organic substances from hands and transient microorganisms.* Hands are then dried with a paper towel or, if unavailable, a single-use hand towel. This type of hand hygiene is suitable for all routine procedures. Refer to Figure 2 and Appendix 8 “How to Hand Wash”.

*Routine social HH with ABHR*

Many studies have stated that ABHR are more effective than hand washing with soap and water. However, HH must be performed with soap and water when there is *Clostridium difficile* or norovirus suspected or known to be present.

*How to use ABHR:*

- apply about 3 ml of the product to the palm of one hand and rub hands together covering all surfaces of the hands and fingers until hands are dry about 20–30 seconds; if hands are dry in 10–15 seconds, not enough hand rub was used. Follow “How to Hand rub” in Appendix 9
- HH with ABHR can be used according to the indications for 5 moments for HH

*Aseptic clinical hand hygiene*

Aseptic clinical HH is undertaken to remove or destroy transient micro-organisms and inhibit the growth of resident microorganisms. This should be carried out prior to any procedures that involve contact with the mucous membrane, non-intact skin or invasive medical device e.g. insertion of central venous line

The HH procedure can be carried out in one of two ways:

- by washing hands and forearms with antimicrobial soap (chlorhexidine gluconate 2% soap) and water, for 40–60 seconds and dried with a hand towel
- use ABHR for 20–30 seconds. This is appropriate for hands that are not soiled with protein matter or fat, or otherwise visibly dirty.

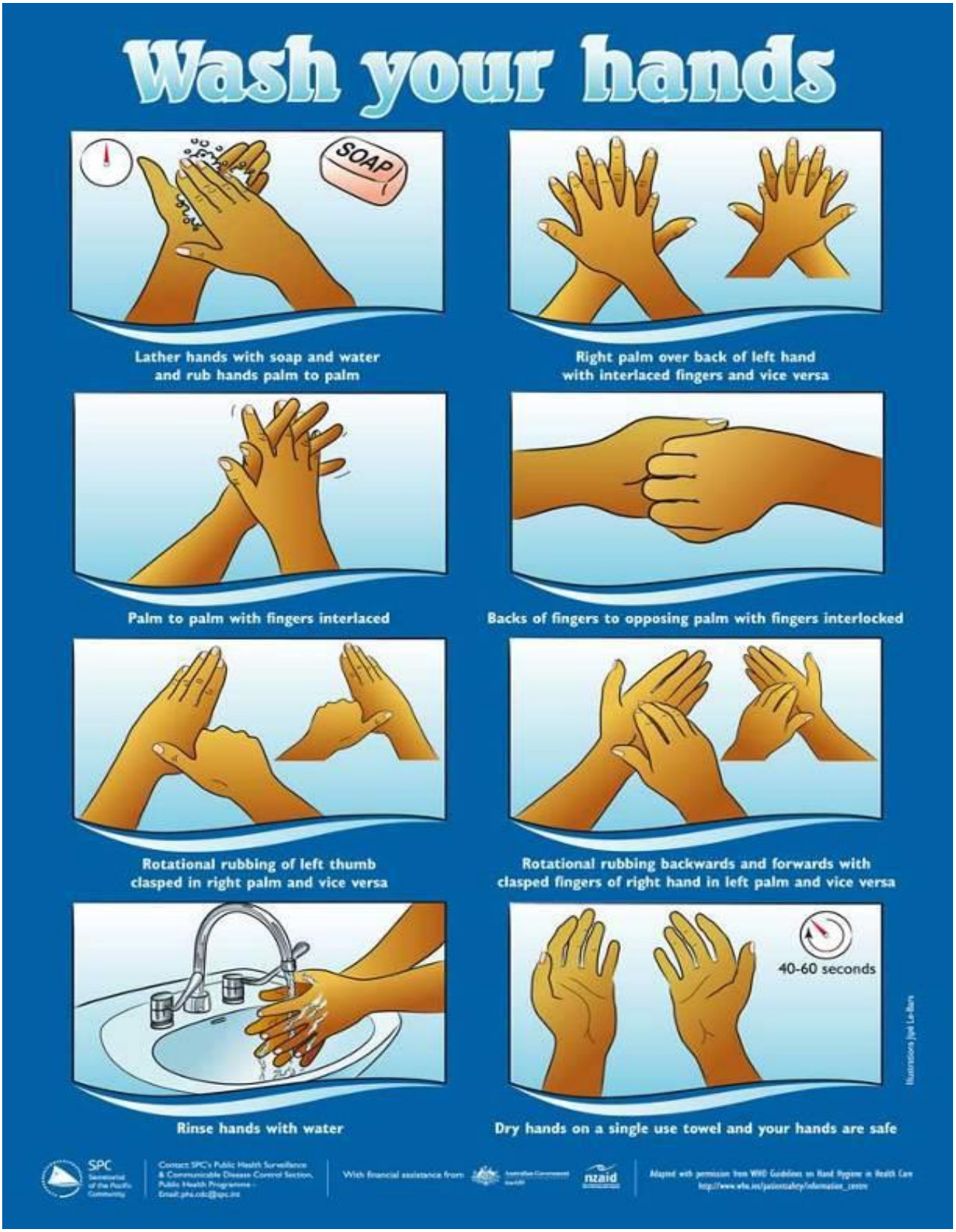
**Note:** Immersing hands in bowls of antiseptics is not recommended.

*Surgical hand antisepsis*

Surgical hand antisepsis removes or destroys transient micro-organisms and reduces the resident flora. Hands and forearms are washed thoroughly with an antiseptic soap for a minimum of 3–5 minutes. Hands are dried using a sterile towel. This should be carried out before all invasive procedures.

The most commonly used products for surgical hand antisepsis are povidone iodine or chlorhexidine containing soaps.

Figure 2: Steps for hand-washing



Many studies discourage the use of surgical hand brush because there is no additional microbial effect. However, use of disposable sponges is recommended.

**Note:** The 1st scrub of the day is five (5) minutes.

Steps before starting surgical hand preparation:

- Keep finger nails short
- Do not wear nail polish or artificial nails
- Remove all jewellery
- Wash hands with non-medicated soap before entering the operating room
- Clean subungual areas with the nail file

Protocol for surgical scrub with antimicrobial soap:

- Start timing, scrub each side of each side, between the fingers, and the back and front of the hand for two (2) minutes
- Scrub the arms keeping the hand higher than the arms at all times
- Wash each side of the arm from wrist to elbow for one (1) minute
- Repeat the process on the other hand and arm keeping the hand higher than the arms at all times. If the hand touches anything at any time the procedure should be lengthened by one (1) minute for the contaminated area
- Rinse hands and arm passing them under water in one direction only, from finger tips to elbows. Do not move the arm backwards and forwards under water
- Proceed to the operating room with hands above the elbows
- Do not splash water on surgical attire or scrubs
- Hands and arms should be dried using a sterile towel and aseptic technique before donning gown and sterile gloves

*Surgical hand preparation with ABHR*

Several long acting (chlorhexidine gluconate or quaternary compounds) ABHR's are licensed for the commercial market. Surgical hand antisepsis using commercially prepared ABHR requires three (3) minutes contact time. However, manufacturer instructions should be followed.

## 4.3. Respiratory hygiene and cough etiquette

Respiratory hygiene and cough etiquette procedures should be applied as a standard infection control precaution at all times by all patients with respiratory symptoms (e.g. coughing, sneezing).

People with respiratory infections should be educated to:

- cover their mouth and nose with a tissue when coughing, and dispose of used tissue in waste and/or garbage containers. If no tissues are available, cough or sneeze into the inner elbow rather than the hands then wash immediately
- spit into tissue if spitting is necessary and dispose of tissue into waste and/or garbage bag
- perform hand HH (use an ABHR or wash hands with soap and water) each time after contact with respiratory secretions
- wear a mask (if available) if you are coughing in order to protect other people in the waiting area
- keep contaminated hands away from the mucous membranes of the eyes and nose

Healthcare facilities should promote respiratory hygiene and cough etiquette by:

- ensuring that appropriate materials are available for patients to adhere to respiratory hygiene and cough etiquette
- promoting the use of disposable tissues (if available) as opposed to using handkerchiefs
- making masks available in waiting areas to reduce the risk of infection transmission
- making hand hygiene (e.g. dispensers of alcohol-based hand rubs) with instructions on how to use it available in waiting areas during an influenza outbreak
- educating patients, family members, and visitors on the importance of covering their mouths and noses with a tissue to help prevent the transmission of influenza and other respiratory viruses
- making appropriate garbage bins (pedal operated) or open bins available in waiting areas for disposal of used tissues
- posting signs requesting that patients and family members with acute febrile respiratory illness use respiratory hygiene and cough etiquette
- ensuring that all staff have access to and are trained in using personal protective equipment

## 4.4. Personal protective equipment (PPE)

Personal protective equipment is an important component in the prevention and control of, and exposure to, infectious diseases. Personal protective equipment is a set of barriers or equipment used to protect the mucous membranes (eyes, nose mouth), airway, skin and clothing from infectious agents.

Depending on circumstances, PPE is part of Standard Precautions and includes: surgical mask or NIOSH-certified N95 particulate respirator masks, eye shields or eye goggles, water proof gowns/aprons and coveralls, shoe covers, head covers, rubber boots (gum boots). PPE cannot be used on its own and must be used simultaneously with standard and transmission-based precautions. It is important to use PPE effectively, correctly and at all times where contact with blood, body substances, excretions and secretions may occur.

The selection of PPE is based on the assessment of:

- Risk of transmission of the infectious agent/microorganism to the patient and HCW
- The risk of contamination of the HCW's skin and clothing by the patient's blood and body substances in consideration of the type of patient interaction and procedure;
- Type of known or possible infectious agent in consideration of:
  - The local context, current epidemiology
  - What is happening in your area, city, other countries
  - An outbreak??
- Likely modes of transmission of the infectious agent

The use of comprehensive PPE is mandatory if direct, close contact with patients suffering from highly pathogenic airborne and droplet viruses is anticipated. Careful removal of PPE is also very important and healthcare workers should receive training in how to put on and remove PPE. Additional specialised training should be obtained prior to working with highly pathogenic organisms.

Personal protective equipment should be worn in a protected environment (e.g. isolation room, operating room etc.) and should not be worn outside that area. Personal protective equipment must be removed before leaving the protected area. This applies to the Operating Room (OR) area as well, OR attire should not be worn outside (i.e. other areas of the hospital).

### 4.4.1. Gloves

Gloves can protect staff and patients from infectious agents like MRO's and is an essential component of Standard and Contact precautions. Gloves are used to protect HCW's hands against contamination and should be worn by all HCW's when touching blood, body substances secretions, excretions and contaminated equipment or surfaces.

When to change gloves:

- Hand hygiene should be performed before and after removal of gloves
- Between care/treatment of patients (to prevention cross transmission of infection)
- When performing separate procedures on the same patient
- As soon as they are torn or punctured
- Before touching non-contaminated items and environmental surfaces

### 4.4.2. Masks, eye protection (face shields/eye goggles)

Masks, eye protection and face shields should be worn to protect mucous membranes of the eyes, nose and mouth which are portals of entry for infectious agents during procedures and patient care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions.
Face and eye protection is an essential component of Airborne and Droplet precautions.

**Note:** Surgical masks can be used by patients who are coughing to prevent transmission of infectious agents.

When masks are worn ensure that:

- It is changed when it becomes wet (it is no longer effective when wet);
- Do not reuse mask once it is removed;
- Do not allow the mask to hang on the neck;

- Do not touch the front of the mask while it is in use;
- Perform HH after removal of a used mask.
- The front of the mask is considered contaminated.

**Table 1: Types and indications of use for gloves**

| Glove type | Indication | Examples |
|---|---|---|
| **Non-sterile examination gloves** | • risk of exposure to blood, body substances, secretions, excretions<br>• contact with contaminated equipment or surfaces<br>• contact with the mucous membranes and non-intact skin<br>• risk of transmission of infectious agents to the patient<br>• if the integrity of the skin of the HCW's hands is compromised. | • Venepuncture<br>• vaginal examination<br>• nasogastric tube insertion<br>• rectal examination<br>• emptying urine bags<br>• minor dressings (cuts)<br>• saliva in dental procedures |
| **Sterile gloves** | • any surgical invasive procedures where aseptic condition must be maintained | • vaginal delivery<br>• insertion of central line etc.<br>• preparation of chemotherapy drugs and total parental nutrition<br>• radiological procedures etc.<br>• lumbar puncture |
| **Nitrile gloves (is resistant to chemicals and disinfectants such as chlorine and glutaraldehyde)** | • preferable for clinical procedures requiring more patient contact<br>• alternative for latex sensitivity or allergy | • recommended for clinical care with Filovirus because it is resistant to chemicals and disinfectants such as chlorine and glutaraldehyde |
| **Reusable utility/household gloves** | Used in non-clinical activities | • cleaning reprocessing equipment in the central sterile department<br>• contaminated equipment<br>• cleaning contaminated surfaces etc. |

**Table 2: Types of mask and indications**

| Surgical mask indications | N95 or P2 particulate respirator mask indications |
|---|---|
| • Procedures that generate large droplets of secretions and excretions.<br>• Procedures that require aseptic techniques to protect the patient from infectious agents<br>• Droplet infections e.g. influenza virus | • Airborne precautions e.g TB<br>• Procedures that generate aerosols of particles of known or suspected infectious agents.<br><br>**Not all N95 particulate respirator masks are fluid resistant, only N95 respirators labelled Surgical respirators are tested for fluid resistance.** |

Considerations for eye protection:

- According to WHO both face shields and goggles are considered to be equally effective, therefore either device can be selected on personal preference
- Fogging can affect both eye shields and goggles, but is less with eye shields, in hot and humid climates fogging can affect visibility and the ability of the HCW to provide patient care. Therefore, it is advisable to use goggles with some form of ventilation
- Face shields provide a wider range of view of the patient and enhances more patient interaction
- Reusable eye shields and goggles should be cleaned with detergent and water or disinfected using the manufactures instructions
- The front of the eye shield/goggle is considered contaminated**.**

### 4.4.3. Fluid resistant gowns, coveralls and aprons

According to the WHO Guide on PPE in the context of Filovirus, coveralls and gowns are equally acceptable as there is a lack of comparative evidence to show if one is more effective than the other. Gowns are easier to put on and take off and are more familiar to HCW's. In addition, in hot and humid climates like the Pacific, heat and humid stress is less with gowns.

- Fluid resistant gowns/coveralls and aprons prevent contamination of infectious agents on clothing and skin during procedures and patient care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions
- Clean, non-sterile gown is adequate to protect clothing for procedures that are likely to generate splashes or sprays of blood, body substances
- A fluid resistant long sleeve gown and apron or coverall is strongly recommended to mitigate against the risk of infectious blood and body substances, secretions or excretions that could penetrate the underlying clothes or skin with potential to subsequently, unknowingly transmit the infectious agent via the hands to the mucous membranes of the eyes, nose or mouth
- Aprons are usually worn over a gown or coverall to protect against splashing of blood, body substances excretions or secretions
- Disposable plastic aprons can be worn for contact precautions to protect against transmission of MROs or other contact infectious agents
- Removal of gowns/aprons should be done before leaving patient area to prevent contamination of the environment

*Head cover*

This is worn to protect the head, neck and hair from contamination of infectious agents and the possibility of unknowingly transmitting the infectious agent via the hands to the mucous membranes of the eyes, nose or mouth.

*Shoe cover and boots* are highly recommended when caring for patients with confirmed or unknown infectious agent that has rapid fatality with a high mortality rate like the Ebola virus. In this situation, boots are preferred because it is easier to clean and disinfect.
Shoe covers are worn over closed shoes to facilitate against decontamination.

### 4.4.4. How to put on and take off PPE

PPE must be worn including head cover and water resistant boots, PPE must cover the mucosae - eyes, mouth and nose from the contaminated droplets and fluid including the skin and hair to ensure protection against contamination of infectious agents and the possibility of unknowingly transmitting the infectious agent via the hands to the mucous membranes of the eyes, nose or mouth. See Appendix 10 for "How to put on and take off PPE".

Before donning PPE:

- HCW's must be trained and competent in PPE donning and doffing procedures before attending to patients in isolation
- It is essential to have a trained observer or 'buddy' to supervise the donning and doffing procedure, to ensure that the correct steps are followed during the process
- Before donning PPE all jewellery, watch, pen and mobile phone should be removed from the pocket
- Protocols for donning and doffing PPE procedures should be available in the donning and doffing area should be strictly followed to prevent missing a step
- There should be appropriate separate places designated for donning and doffing PPE
- Ensure that there is a mirror available, this is helpful in adjusting the PPE and to check that the PPE is placed on correctly and during the removal of PPE

When donning PPE:

- PPE must be put on using the correct order according to the donning procedure which ideally should be placed in the area, this is because once the HCW enters the patient zone, the PPE cannot be adjusted
- The observer or buddy should check the integrity of the PPE to ensure a good fit.

When wearing PPE during patient care

- Do not touch the eye protection (face shield/goggle) or mask
- Keep hands away from face
- Limit touching surfaces, no sitting, running or leaning against the wall
- PPE cannot be adjusted during this time
- If there is a partial or total breach e.g. gloves torn, or insect entered the goggle, the HCW must immediately leave the patient environment to the doffing area to remove PPE under the supervision of the trained observer or buddy

When removing PPE

- This must be done in the designated doffing area under the supervision of the observer/buddy
- The buddy must guide the HCW through the correct steps for doffing PPE, slowly to avoid self-exposure
- Discard PPE in the appropriate designated container
- Perform HH

## 4.5. Safe use and disposal of sharps

The most common way in which HCWs are at risk to HIV, hepatitis C and hepatitis B viruses at the workplace is through accidental injury with sharp objects. The potential for transmission of blood borne diseases is greatest when needles and other sharp instruments or devices are used. Special care should be taken to prevent injuries when cleaning reusable sharp instruments and disposing of sharps.

### 4.5.1 Responsibility for sharps

All HCWs who use sharps are responsible for their safe disposal into “sharps containers”.

Safe practices when handling sharps include the following:

- Sharps should not be passed by hand between a health care worker and any other person; a puncture resistant tray or kidney dish must be used to transfer sharps
- Needles should never be recapped
- Do not bend needles, lancets or other sharp after use
- Sharps should never be forced into a sharps container

Cleaning staff should not be required to clean up loose sharps. Loose sharps should be notified to the on-duty medical supervisor so that HCWs can dispose of sharps properly. This will also serve to encourage proper disposal of sharps in the first place.

### 4.5.2 Sharps containers

Official sharps containers should be ordered well in advance of their anticipated need to prevent shortages. If absolutely necessary, a puncture-proof container can be made from thick plastic, cardboard or metal. Use locally available items such as a heavy plastic bottle or a milk tin if there are no special sharps containers available.

- Dispose of all sharp objects in puncture-proof containers which must be labelled “sharps”
- The container should have an opening that is wide enough to allow the sharps to be dropped into it
- The container should never be overfilled and should be replaced when it is three-quarters full. When it is three-quarters full, close the lid or cover with tape
- Sharps containers should be placed as close as practical to the point of use. For example, containers should be placed on the medicine trolley, and in the treatment or immunisation room
- Sharps containers should not be placed in a place where they are easily accessible to children

- Sharps containers should be incinerated and then buried. They should not be disposed of in a regular municipal waste facility

## 4.6. Routine environmental cleaning

Infectious agents present in the hospital environment can be transmitted to patients via the hands of staff when they have contact through contaminated equipment or the environment. Therefore, frequent environmental cleaning reduces the number of micro-organisms and is a vital component of standard precautions.
Cleaning refers to the use of mechanical action, water and detergent followed by rinsing and drying with the aim of removing organic matter and soils from the environmental surface. Routine environmental cleaning prevents microorganisms from multiplying on clean dry surfaces and also enhances the well-being of patients and staff. Housekeeping staff and HCWs have the responsibility of helping to keep the environment clean and safe, not just for patients but for their colleagues as well; cleaners are an integral part of the healthcare system.

The level of cleaning required in certain areas of a health facility depends on the risk of contamination with infectious agents. For example, the general areas of the hospital will require regular cleaning as opposed to areas like the Isolation units and the Intensive care units where there is a risk of MRO transmission, will require additional levels of cleaning.

### 4.6.1 Cleaning schedules

In healthcare the recommended cleaning schedules is determined by the risk of transmission of an infection within the environment. The recommended schedules for cleaning includes: frequency and methods and are divided into two main areas. Refer to Appendix 11 for recommended cleaning schedules.

*Minimal hand contact areas* e.g. floors, walls ceilings and non-patient areas:

- Require routine cleaning with detergent solution
- Damp mopping is recommended over dry mopping

*Frequent hand contact areas or high risk surface areas are in-patient areas* e.g. doorknobs, bedrails, bedside table, wall areas around the toilet and bathroom. These areas:

- Require cleaning with detergent solution more frequently than minimal hand contact areas
- When MRO's are suspected or known to be present in an area, routine cleaning should be intensified and is cleaned twice with the 2$^{nd}$ clean to include a disinfectant recommended by the healthcare facility e.g. sodium hypochlorite
- Shared clinical equipment in these areas such as trolleys, knobs of certain machines etc. should be frequently cleaned using detergents

All healthcare facilities should have a cleaning schedule with clear lines of responsibilities for Housekeeping staff and HCWs and should include:

- Rosters
- Frequencies of cleaning required and methods for cleaning
- The products used to clean specific areas with standard operating procedures for mixing solutions
- Clear standard operating procedures on cleaning mops, buckets and other items

### 4.6.2. Use of disinfectants

When there is a presence of infectious agents e.g. clostridium difficile or MRO patient requiring transmission based precautions, the cleaning schedule and frequency should be intensified to include:

- physical clean with detergent and followed by a disinfectant, this is called a two (2- step clean) or
- physical clean with a two in one (2-in-1step clean) which consist of a combined detergent and disinfectant

Physical (manual) cleaning with detergent solution is the most important step in the cleaning process, sole reliance on using detergent solution or 2-step clean without manual cleaning is not recommended.

Many disinfectants are active against enveloped viruses, such as the COVID-19 virus, including commonly used hospital disinfectants. Currently, WHO recommends using:

- 70% ethyl alcohol to disinfect small areas between uses, such as reusable dedicated equipment (for example, thermometers);

- sodium hypochlorite at 0.1% (1000 ppm) for disinfecting surfaces and 0.5% (5000 ppm) for disinfection of blood or bodily fluids spills in health-care facilities.

**Note:** Instrument disinfectants should not be used for environmental surface disinfection.

### 4.6.3. Colour coding cleaning equipment

A standard for colour coding cleaning equipment is the most effective method of restricting equipment to individual areas of health facilities. Equipment may include dry mops, wet mops, mop handles, buckets, wringer buckets, gloves. All other equipment that would assist in the control of infection should also be colour coded.

| **Typical colour coding for equipment** | |
|---|---|
| Infectious/isolation areas | **yellow** |
| Toilets/bathrooms/dirty utility rooms/sluice | **red** |
| Food service/preparation areas | **green** |
| General cleaning | **blue** |
| Operating theatres | **white** |

### 4.6.4 Important housekeeping practices

Important housekeeping practices include the following.

- Prepare cleaning solutions daily according to facility procedure
- When using neutral detergent, follow dilution instructions. Too much or too little water may not destroy micro-organisms
- Scrubbing with detergent and water is the most effective way to remove dirt and micro-organisms
- Always wash hands after cleaning procedures
- Wear utility gloves to clean contaminated areas such as toilets, spills of blood and body fluids
- Write schedules for all housekeeping personnel for more effective housekeeping practices
- Use a wet cloth or mop for walls and floors. Dry sweeping and dusting spread dust and micro-organisms into the air and onto patients and clean surfaces
- Use separate equipment (e.g. cloth, brushes, buckets) for cleaning contaminated areas such as toilets
- Change solutions when they look dirty
- Wash cleaning cloths and mops daily and dry them in the sun. Soiled cleaning equipment can spread micro-organisms
- Always clean from top to bottom, so that soil and dust that falls on the floor will be cleaned-up last

**Note**: Avoid soiling clean areas while you are cleaning dirty areas. Do not use disinfectant fogging (fumigation with formalin). Fogging may be toxic (poisonous). Manual cleaning with detergent and water is more effective way to remove micro-organisms from rooms and cabinets.

**Note**: Always use a different cloth when cleaning floors, bathrooms, and patient items.
Establish schedules for cleaning floors, environmental surfaces, sinks and toilet areas.

### 4.6.5. Housekeeping audits and checks

It is recommended that healthcare facilities have a system to include colour coding, checklists and cleaning manuals to ensure that cleaning standards are met regardless of whether cleaning services are outsourced.

Auditing of cleaning should be carried out on a regular basis and is normally done via visual inspection.

### 4.6.6. Cleaning spills of blood and other body fluids

The purpose of cleaning up spills of blood and other body fluids is to destroy harmful micro-organisms such as HIV, HCV and HBV.

The items needed for cleaning spills include:

- Neutral detergent
- Cloth or old pieces of linen, paper towel
- Mop

The procedures for cleaning spills are:

1. Wear gloves and other PPE
2. Wipe up spills with a cloth or paper towel and discard in waste bin
3. Mop up remainder of the spill using neutral detergent
4. Follow 2-step clean if infectious agent is a concern

## 4.7. Appropriate handling of laundry

The objective of the laundry system is to provide a properly designed laundering programme in a safe and sanitary environment, and ensuring the supply of clean and hygienic laundry. Health service managers and staff share the responsibility for achieving this objective.

Health service managers are responsible for providing:

- an appropriate and safe laundry facility;
- standard procedures and guidelines for handling, using and laundering clean and contaminated linen
- training, educating and instructing staff about potential infectious hazards and techniques to prevent the spread of infection

Linen used in healthcare facilities carries many micro-organisms. Used linen that is soiled with blood, urine, faeces or other body substances may be particularly infectious. Processing soiled linen consists of collecting, transporting and sorting the linen before it is washed, followed by storing and distribution.

HCWs are responsible for ensuring that:

- standard precautions apply when handling clean and contaminated linen
- linen is free of foreign matter such as sharps and instruments before it is sent for laundering
- soiled and infectious linen is appropriately treated and handled in accordance with the facility's policies and procedures
- used linen is not sorted in patient care areas

### 4.7.1 Using personal protective equipment

When collecting, handling, transporting, sorting or washing soiled linen, housekeeping and laundry staff should wear:

- household utility gloves
- closed shoes that protect feet from sharp items and from blood and body fluid spillages
- protective eyewear
- plastic or rubber aprons

### 4.7.2. Collecting and transporting soiled linen

The following steps should be taken when collecting and transporting soiled linen

- Place used linen in bags or in linen trolleys with lids. If linen is heavily soiled with blood and/or body fluids, it should be placed in a leak-proof bag or a container with a lid
- Handle soiled linen as little as possible and avoid shaking linen to prevent the spread of micro-organisms into the environment and to people
- Linen should not be sorted or washed in patient care areas
- Transport collected soiled linen in trolley carts with lids or covered carts to the laundry processing area once or twice daily
- Transport soiled linen and clean linen separately, using separate trolleys labelled accordingly

### 4.7.3. Sorting soiled linen

Sorting soiled linen is important because in addition to linen soiled with blood and body fluids, linen from places such as operating theatres, labour wards and other procedural areas sometimes contain sharp instruments and soiled dressings soaked with blood and body fluids. When sorting linen, heavy utility gloves, protective eyewear and plastic aprons should be worn. Any items found during sorting should be disposed of properly.

### 4.7.4. Laundering linen

The following steps should be taken when laundering soiled linen:

- Separately wash heavily soiled linen from non-soiled linen
- Use the washing machine's time cycle according to the manufacturer's instructions
- Water temperatures should be above 71°C (160°F)
- When wash cycle is completed, linen should be checked for cleanliness and rewashed if still stained or dirty

### 4.7.5. Storing, transporting and distributing clean linen

The following measures should be taken when storing, transporting and distributing clean linen:

- Store clean linen in clean, dry closed storage cupboards
- Use physical barriers to separate folding and storage room from soiled areas
- Clean and soiled linen should be transported separately in separate trolleys
- Clean linen should be covered during transport to avoid contamination

### 4.7.6 Laundry staff

Good staff practices help reduce the risk of cross-contamination and prevent injury. Therefore, staff should:

- be adequately trained in standard precautions, including hand washing and the risks involved if undertaking other tasks within the facility (e.g. food preparation, patient care). These activities should never be done in laundry areas
- be educated and trained (and supervised, if appropriate) in the safe use of equipment and machinery, and in safe work practices, including safe manual handling techniques
- wear appropriate protective clothing and wear appropriate gloves when sorting laundry
- not eat or smoke in the laundry area
- not handle linen if they have exfoliative skin conditions (e.g. conditions where skin flakes off), unhealed wounds or rashes, unless appropriate protective measures are adopted (such as covering wounds with bandages)

## 4.8 Healthcare waste management

Safe waste disposal helps to:

- prevent the spread of infection to healthcare workers who handle the waste, and to the local community
- protect those who handle waste from accidental injury
- prevent open piles of waste that can become breeding ground for flies, other insects and rats, which carry diseases
- prevent build-up of waste, which may pose fire hazards
- provide a pleasant atmosphere (uncollected waste causes foul smells, and is unsightly)

The key to effectively managing healthcare waste is segregation (separation) and identification. Segregation is the responsibility of the waste producer, and should take place as close as possible to where the waste is being generated. Healthcare waste should be categorised and placed into colour-coded bags or bins.

Two important points to remember with regards to waste disposal is that 1) open piles of waste are dangerous, and 2) hospital and health centre wastes should be disposed of in an area with a fence around it. All waste should be incinerated or buried.

### 4.8.1 Categories of healthcare waste

*General waste*

General waste includes wastes that do not carry harmful micro-organisms. Examples of general wastes include kitchen refuse, paper waste, boxes, bottles and plastic containers that store products used by the hospital or clinic.

*Infectious and/or clinical wastes*

**Solid and liquid infectious and/or clinical wastes** carry harmful micro-organisms and are likely to cause infection among patients, HCWs or people in the community. Infectious wastes may be solid wastes, liquid wastes or laboratory wastes. Examples include used dressings, gauze or other items contaminated with blood, pus, faeces, urine, blood or other body fluids; human tissue; body parts; paper specimen collection cups; pathology samples.

**Pathological waste** includes human materials removed during surgery, labour or delivery; autopsy; embalming; or biopsy, including body parts and tissues and foetuses; products of spontaneous or induced human abortions, regardless of the period of gestation, including body parts, tissues and foetuses, organs and bulk blood and body fluids. Pathological waste also includes laboratory specimens of blood and tissue after completion of laboratory examination.

**Sharps** include needles, lancets, hypodermic syringes with attached needles, scalper blades, razor blades, glass pipettes, broken glassware, intravenous spikes, and any other sharp object with the potential to penetrate intact skin

**Pharmaceutical and cytotoxic wastes**

Pharmaceutical and cytotoxic wastes include expired, unused, split and contaminated pharmaceutical products, drugs and vaccines that are no longer required and need to be disposed of appropriately. This category of waste also includes discarded items used in the handling of pharmaceutical supplies such as bottles and boxes with residues, gloves and masks, connecting tubing and drug vials.

Cytotoxic drugs are also known as anti-neoplastic drugs or cancer chemotherapy drugs. These are highly hazardous wastes that have mutagenic, estrogenic or carcinogenic properties. Cytotoxic wastes include:

- Cytotoxic drugs (e.g. azathioprine, chlorambucil, cisplatin, 5-Fluouracil, cyclosphamide, melphalan and methotrexate)
- Vomit, urine or faeces from patients treated with cytotoxic drugs
- Contaminated materials from cytotoxic drug preparation and administration such as syringes and needles, dressing packs and gauge vials

**General tips for safe waste disposal**

- Use separate marked containers for clinical wastes.
- Use washable waste containers that are strong and will not rust (plastic is best). All waste containers should have lids.
- Do not use waste containers for any other purpose in the hospital or health centre.

### 4.8.2 Colour-coding or labelling containers

Colour-code or label containers for the following types of waste:

- **Sharps:** Dispose of in puncture-proof containers so they do not cause injury. These items can spread HIV, HCV and HBV. Sharps containers should be colour-coded red or yellow, or at a minimum, have an infectious sharps sticker placed on the container.
- **General:** Collect in separate containers for burning or for collection by the municipal authority for disposal at the landfill. General waste may be collected into black, white or clear coloured plastic bags.
- **Infectious/clinical/pathological:** Collect in separate containers for incineration. Heavy duty yellow or red plastic bags with an infectious logo on them.

- **Cytotoxic/pharmaceutical waste**: Collect in separate containers for incineration. Cytotoxic waste should be colour-coded purple.

### 4.8.3. Safe collection of general waste

General waste does not carry harmful micro-organisms. Examples of general waste are kitchen refuse, paper waste, boxes, bottles and plastic containers that store products used by the hospital or clinic. To prevent open piles and scattering of rubbish, bins must be placed in places where they are easily accessible. Signs on general waste containers should read: "**GENERAL WASTE NO CONTAMINATED WASTE, NO SHARPS**".

Procedures for disposing of general waste:

1. Collect waste in leak-proof bins
2. Place bins at convenient locations so that they will be used
3. Encourage patients to use the bins
4. Provide separate containers for non-burnable waste such as bottles and cans
5. Wear thick work gloves when handling and transporting waste. This will help to prevent injury
6. Collect bins daily or more often if needed and carry to waste area for incineration or for collection by municipal authorities. A trolley or wheel-barrow may be used to help transport waste from the hospital to the incinerator
7. Clean up all spills immediately with a broom and shovel, and wash the area with soap and water
8. Wash all rubbish bins with soap and water daily
9. Wash hands after handling rubbish bins

### 4.8.4. Safe collection and disposal of infectious and/or clinical waste

Infectious and/or clinical waste carries harmful micro-organisms and can cause infection among patients, HCWs or people in the community. Infectious and/or clinical waste is divided into four categories:

- Sharps
- Solid clinical waste
- Liquid clinical waste
- Pathological waste

Examples are used dressings, gauze or other items contaminated with blood, pus, faeces, urine, blood or body fluids; human tissue; body parts; paper specimen collection cups; pathology samples; needles; scalpel blades.

*Sharps disposal*

Procedures for collecting and disposing of sharps:

1. Wear thick work gloves when transporting sharps containers to the incinerator to prevent injury.
2. Ensure that the sharps container lid is closed or sealed with tape before transporting it to the incinerator site.
3. Collect containers daily, or more often if needed, and carry to incinerator for burning.
4. Wash hands after handling sharps containers.

*Solid clinical waste disposal*

Examples of solid clinical waste include used dressings, gauze or other items contaminated with blood, pus, faeces or other body fluids; human tissue; body parts; paper specimen collection cups. Proper disposal of solid clinical waste helps to prevent the spread of micro-organisms from contaminated waste to staff, patients and the community. Clinical solid waste should be burned or incinerated.

There should be a separate clinical waste bin with a lid. The bin should be lined with a plastic bag and should have no holes. Bins should be labelled "**CLINICAL WASTE, NO SHARPS"**

Procedures for disposing of solid clinic waste:

1. Place bins in places where they will be used
2. Wear thick gloves when handling and transporting wastes
3. Collect bins daily, or more often if needed, and transport to incinerator for burning
4. Clean up all spills immediately with a broom and shovel, and clean area with a neutral detergent
5. Each day, wash waste bins with soap and water

6. Wash hands after handling waste bins

*Liquid clinical waste disposal*

Examples of liquid clinical waste include blood, urine, faeces, pus, sputum, spinal and peritoneal fluids, and pathology specimens. Proper disposal of liquid clinical waste helps to prevent the spread of micro-organisms from contaminated liquid waste to staff, patients and the community.

Procedures for the disposal of liquid clinical waste:

1. Wear thick work gloves when handling and transporting wastes
2. Wear eye goggles to protect eyes from splashing
3. Carefully pour blood, urine or other body fluids directly into toilet, utility sink drain. **Avoid splashing**
4. Rinse the sink or toilet carefully and thoroughly with water
5. When stool or sputum is collected in paper specimen cups, treat as clinical solid waste
6. Wash hands after handling liquid waste

*Laboratory waste disposal*

Examples of laboratory waste include used culture plates, specimen containers and specimens. The proper disposal of laboratory waste helps to prevent the spread of micro-organisms from microbiology laboratory waste and other specimens to staff, patients and the community.

An autoclave or pressure cooker is used to sterilise laboratory waste before disposal into a separate plastic bin with a yellow or red plastic bin liner labelled (in black) "**BIOHAZARD WASTE**".

Procedures for disposing of laboratory waste:

1. Autoclave all petri dishes and test tubes that have been used to grow micro-organisms *before* incineration
2. After sterilising, discard disposable petri dishes and test tubes into a bin marked "**CLINICAL WASTE**"
3. After sterilising, remove the culture media from reusable petri dishes and test tubes and discard into a "**CLINICAL WASTE**" bin
4. Wash and dry reusable petri dishes and test tubes
5. Collect "**CLINICAL WASTE**" bins daily, or more often if needed
6. Each day, wash bins with soap and water
7. Wash hands after handling bins

### 4.8.5. Handling healthcare waste bags

Procedures for handling healthcare waste bags:

1. Check that waste storage bags and containers are effectively sealed. Bags should be picked up by the neck only. They should be placed down in such a way that they can again be picked up by the neck for further handling. Waste bags should be manually handled as little as possible
2. Bags should not be held against the body nor should collection staff attempt to carry too many bags at a time
3. Avoid letting the bag come into contact with the body when being carried. A needle stick is the most likely hazard to endanger the person collecting the waste bag. Hypodermic needles that are not properly segregated into correct sharps containers can cause this type of injury
4. Sharps have been known to pierce the sides and bottom of polypropylene containers. These containers should be picked up and carried by the handle provided. The other hand should not be used to support the bottom of the container
5. Avoid puncturing or damaging waste bags, and do not throw or drop them
6. Ensure that infectious wastes are not mixed, and that bags are stored in designated storage areas
7. Protective clothing should be worn during all waste handling operations
8. Transport all waste bags directly to the designated central storage for disposal
9. Bags of hazardous healthcare waste and of general waste should not be mixed at any time, but should be segregated throughout handling; hazardous waste should be placed only in specific storage areas. If hazardous waste is accidentally placed in general waste, the entire quantity of waste must be treated as hazardous

### 4.8.6. Scavenging

Steps must be taken to ensure that scavenging does not take place at the hospital waste storage sites as this could be detrimental to the individual's health. The waste storage shed or area must be kept locked

at all times when not attended, and care should be taken to ensure that only properly prepared and non-hazardous waste is disposed of through the municipal garbage disposal system.

### 4.8.7. Methods of solid waste disposal

*Incineration or burning*

Incineration is a process of burning wastes at very high temperatures. Incineration requires special equipment and a fuel source such as diesel or gas. Incineration is the best way to destroy contaminated wastes. The advantages of incineration and burning are that micro-organisms are destroyed by the heat, and large amounts of wastes that require considerable space are reduced to ashes.

The hospital incinerator should be housed in a locked enclosure and only used by trained operators. The incinerator must be operated in accordance with the manufacturer's instructions. Incineration equipment must be kept in good working condition and be serviced on a regular basis in accordance with the manufacturer's instructions.

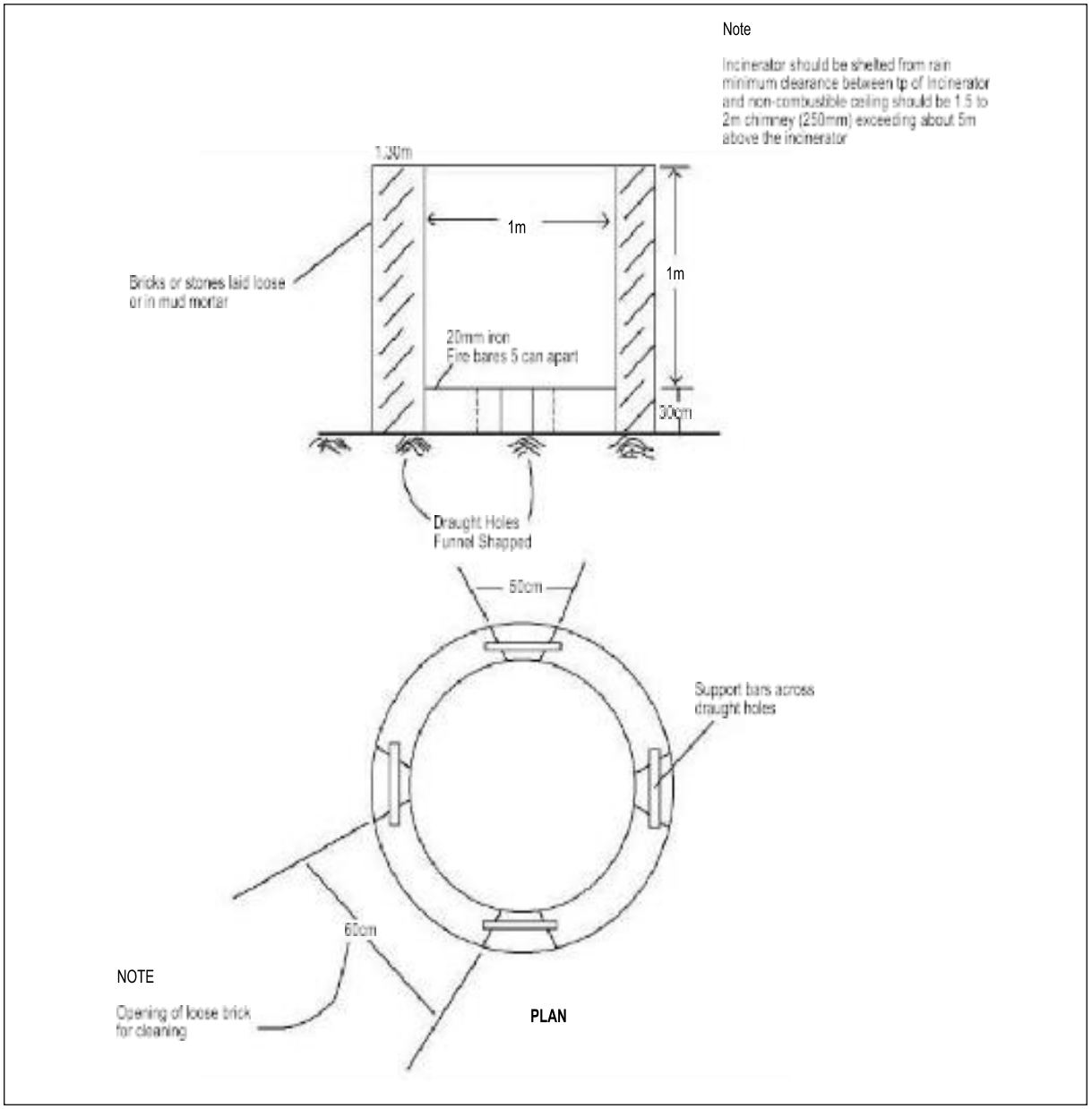
*Building and using a simple stove for burning wastes*

In situations where incineration equipment is not available, burning can be done in a simple, large stove. Open burning is dangerous; therefore, all waste should be burned or incinerated in special stoves located in enclosed (properly fenced) areas.

Below are basic guidelines for building and using a simple stove for burning waste:

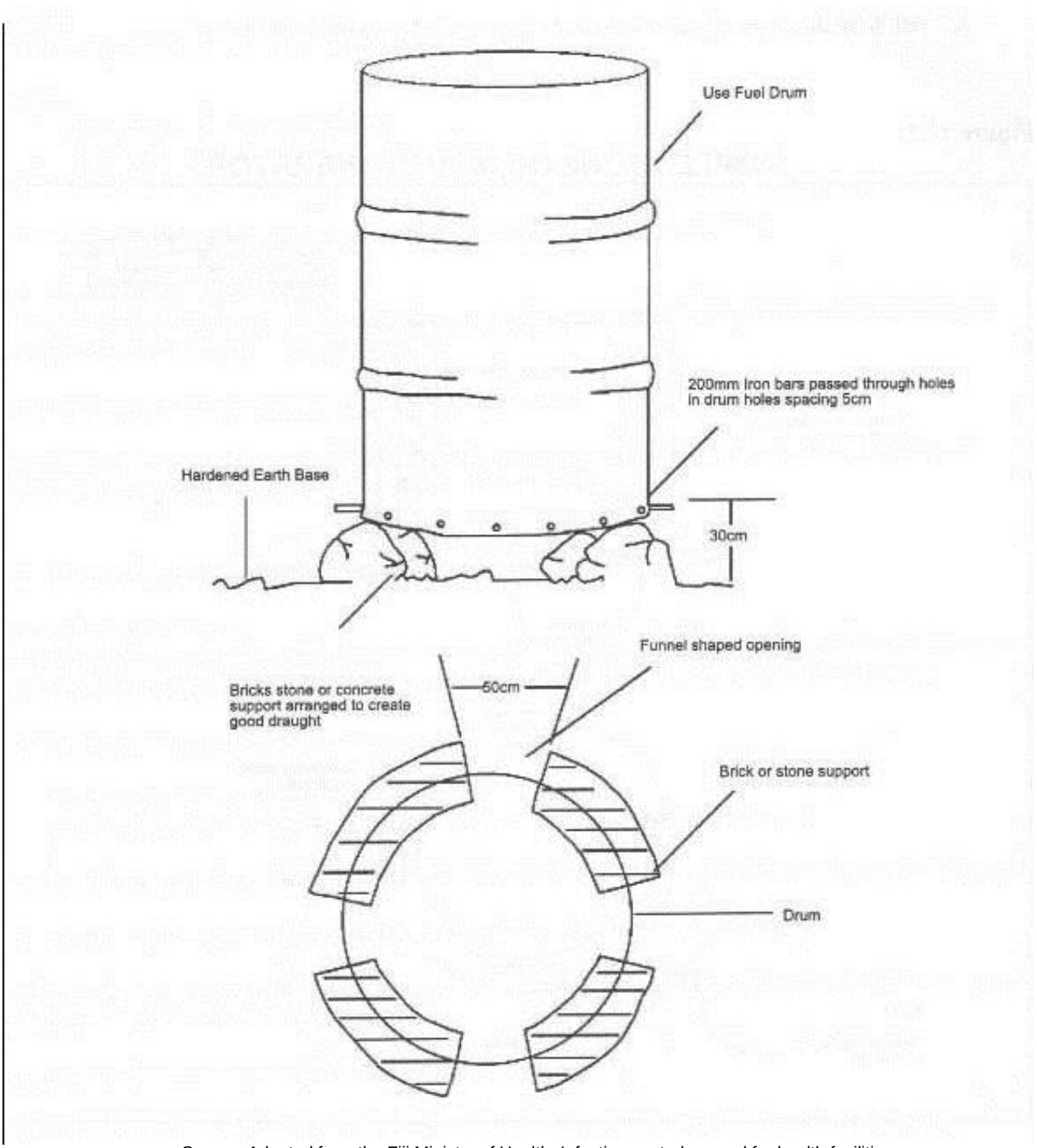
8. Select a site downwind from the healthcare facility
9. Build a simple stove using local materials (mud or stone), or a used oil drum
10. Place the stove on hardened earth or a concrete base
11. Make sure the stove has:
    - Sufficient air inlets underneath to burn well,
    - Loosely placed metal bars to hold wastes and allow ashes to fall below, -
    - Enough space to add waste at the top and to remove ashes from below,
    - Long enough chimney to allow for good draught and removal of smoke.
12. Burn all burnable waste, such as paper and cardboard, as well as dressings and other contaminated wastes
13. If the waste is wet, add kerosene so that a hot fire burns all the waste. Store waste for incineration in covered rubbish bins
14. Ash from the stove or incinerator can be treated as non-contaminated waste. Note, however, that sharps, even after incineration, may be dangerous and should be buried (see below)

**Figure 3: Simple stone or mud incinerator**




Source: Adapted from Fiji Ministry of Health, Infection control manual for health facilities

Figure 4: Simple oil drum incinerator




Source: Adapted from the Fiji Ministry of Health, Infection control manual for health facilities.

*Waste disposal by burying*

When clinical and non-clinical wastes cannot be burned or incinerated, waste must be buried. Even if wastes are collected by a city collection system, it is good for healthcare administrators to make sure the waste is disposed of safely. When wastes are buried, certain requirements must be met so that children and animals cannot dig up the waste.

**Note**: Sharp objects may not be destroyed by burning and may later spread tetanus infection. Dispose of all sharp objects by putting them underground, even after burning.

Procedures for making and using an underground waste disposal site:

7. Select a site that:
    - is at least 50 meters (150 feet) away from any water source, to prevent contamination of the water supply.
    - has proper drainage, is located downhill from any wells, and is free of standing water.
    - is not in an area that floods.
8. Dig a pit 1 meter (3 feet) wide and 2 meters (6 feet) deep. The bottom of the pit should be 2 meters above the water table.
9. Fence in the site to keep animals and children away.
10. Wear heavy gloves when handling waste buckets.
11. Empty buckets of non-burnable waste into the pit every day.
12. Cover the waste with a thin layer of earth each day. The final cover should be 10 centimetres deep.

**Note**: General waste is the only waste that can be disposed of in a municipal garbage facility (i.e. landfill). It is illegal and dangerous to dispose of other wastes with municipal garbage.

**Table 3: Safe waste disposal**

| | **Waste type** | **Waste bag colour** | **Disposal** |
|---|---|---|---|
| **General waste** | Kitchen refuse, paper waste, boxes, bottles, plastic containers | black | Local Level Govt Collection/ Incineration |
| **Sharps** | Needles, broken or disposal syringes, razors, lancets, scalpel blades | sharps container yellow or red | Incinerate, then bury |
| **Solid infectious and/or clinical waste** | Dressings, gauze, or other items contaminated with blood, pus, faeces or other body fluids; human tissue; body parts; paper specimen collection cups | yellow or red | Incinerate |
| **Liquid and clinical waste** | Blood, urine, faeces, pus, sputum, spinal and peritoneal fluids, pathology specimens | no bags | Drain fluids into toilet or utility sink; or place in contaminated waste bin, and incinerate |
| **Laboratory waste** | Used culture plates, specimen containers, specimens | yellow or red | Sterilise, place in contaminated waste binds, and incinerate |
| **Cytotoxic waste** | Cancer treatment drugs and used consumables | Purple | Incinerate |
| **Pharmaceutical waste** | Tablets, mixtures and injectables | Yellow | Incinerate |

## 4.8.9. Garbage storage and disposal

Garbage should be removed at least twice daily and no garbage should be left in kitchen areas overnight. Not only are many common pests capable of transmitting infection, but the sight of insects and pests within the hospital environment can be very disturbing to patients, staff and visitors alike. It is, therefore, a basic requirement of the hospital cleaning programme that adequate attention be paid to preventive and protective measures designed to minimise this potential form of cross infection.

In general, six elements are essential in any effective programme for the control of pests in a hospital.

- Thorough, constant cleaning of all potential areas of infestation
- Regular, careful inspections for evidence of pests
- Storage of waste and garbage in water-tight containers
- Thorough cleaning of all garbage containers after use
- Daily removal of all stray garbage not placed in correct receptacles
- Proper storage of all goods and supplies likely to attract pests

## 4.9. Reprocessing of reusable medical equipment and instruments

Used instruments and equipment can be a reservoir for micro-organisms, and therefore spread infections to patients and staff. Procedures that prevent the spread of infection from reusable instruments and equipment are cleaning, disinfection and sterilisation. Before disinfection and sterilisation can be achieved, however, all instruments must be cleaned and rinsed.

**Table 4: Instruments and equipment by application and sterilisation method**

| Category | Application | Type of processing | Example of items |
|---|---|---|---|
| Critical | Sterile tissues in the body | Sterilisation | Surgical instruments, diagnostic catheters, dental instruments bronchoscopes, cystoscopes |
| Semi-critical | Non-sterile tissues in the body | Disinfection | Respiratory therapy equipment, dental impressions and other prosthetic appliances, gastroscopes, colonoscopes, endoscopes |
| Non-critical | Instruments that come in contact with intact skin | Cleaning | Bedpans, ECG leads, thermometers, stethoscopes, beds, bedside tables |

After cleaning, all instruments and other items used to touch tissue beneath the skin (such as during surgery or giving an injection) or to touch mucous membranes (such as during vaginal examination) should be sterilised or undergo high-level disinfection (HLD).

Sterilisation is the safest and most effective method for the final processing of instruments. When sterilisation of equipment is not available or not suitable, HLD is the only acceptable alternative.

**Definitions association with cleaning, disinfection and sterilisation**

| | |
|---|---|
| **Cleaning** | Physical removal of soil and micro-organisms from the skin and objects with soap and water |
| **Detergent** | A cleaning agent available in two forms: liquid or powder |
| **Decontamination** | Cleaning an object to reduce the number of micro-organisms on it by either chemical or physical means |
| **Disinfection** | A process that kills or destroys most disease producing organisms, but rarely kills spores. Disinfectants are used on inanimate objects as opposed to antiseptics, which are used on living tissue |
| **Sterilisation** | A process that destroys all forms of microbial life, including bacteria, viruses, spores and fungi. This method is used for all items that contact normally sterile areas of the body. |

**Note**: Keep used, dirty items separate from clean and sterile ones to prevent cross contamination

### 4.9.1. Cleaning

The cleaning process is very important because:

- cleaning with neutral detergent and water removes protein, blood and other body fluids, oils and grease
- disinfection and sterilisation will not destroy micro-organisms trapped in small particles of blood or protein. Thorough cleaning must be done to remove these particles
- when sterilisation facilities (steam heat or hot air oven) are not available, cleaning is the only way to protect patients from pathogenic spores

*Choosing a detergent for cleaning instruments and equipment*

Using a hospital grade neutral detergent is important for effective cleaning because water alone will not remove protein, oils and grease. Bleach powder without a detergent should not be used. Hand soap should not be used because it is made from fat (lard), and will leave a film or scum on instruments. Micro-organisms can become trapped in the scum, and will not be destroyed during sterilisation or disinfection.

The cleaning solution must be appropriate for the type of equipment or instrument. Enzymes usually Proteases are added to solutions to neutralize the PH solutions to aid in removing organic material such as blood and pus.

Additionally, lipases (enzymes to act on breaking down fats) and amylase enzymes (to act on breaking down starch) is added to solutions.

**Note:** enzymes are not disinfectants and should be rinsed off instruments.

Do not use abrasive cleaners because they can scratch instruments. Scratches are places where micro-organisms can become trapped, and scratches increase metal corrosion (rusting).

### 4.9.2. Equipment and procedures for cleaning environmental surfaces

Cleaning environmental surfaces helps destroy and remove soils and micro-organisms, making environmental surfaces such as operating tables or delivery tables safe to use for the next patient.

The items needed to properly clean environmental surfaces include:

- Neutral detergent
- Clean water
- Plastic bucket
- Household gloves

Procedures for cleaning environmental surfaces are as follows.

1. Put on gloves
2. Using a cloth soaked in neutral detergent, wipe metal and plastic surfaces
3. Allow surfaces to air-dry

### 4.9.3 Routine cleaning of used instruments and equipment

Routine cleaning of instruments and equipment removes many micro-organisms.

The items needed for the routine cleaning of instruments and equipment include:

- Neutral detergent
- Clean water
- Brush
- Gloves (utility gloves are best)

Procedures are as follows.

1. Put on gloves
2. Completely disassemble all items
3. Using detergent and water and brush, completely remove all blood, tissue and dirt. Carefully clean small spaces and teeth of clamps

4. Thoroughly rinse with water, because detergent can interfere with the disinfection or sterilisation process
5. Air-dry equipment as moisture can interfere with the sterilisation or disinfection process
6. Instruments and equipment are now ready for sterilisation or disinfection

### 4.9.4. Disinfection

Disinfection is a process that inactivates vegetative microorganisms from inanimate objects without ensuring the elimination of bacterial spores.

*High-level disinfection*

High-level disinfection (HLD) is a liquid chemical agent that eliminate all microorganisms, examples are: glutaraldehyde, formaldehyde, hydrogen peroxide etc.

**Points to remember when cleaning instruments and equipment**

- Thorough cleaning is the most important step when reprocessing instruments and equipment.
- Wear gloves while cleaning instruments and equipment. Thick household or utility gloves are best because they help to prevent injury from sharp objects.
- Completely disassemble any equipment that can be taken apart, before cleaning (e.g. clamps and scissors).
- Use a brush for cleaning. A small brush (e.g. toothbrush) can be used to carefully clean very small areas where micro-organisms may become trapped (e.g. teeth of clamps, screws and joints).

To make sterilisation or HLD effective:

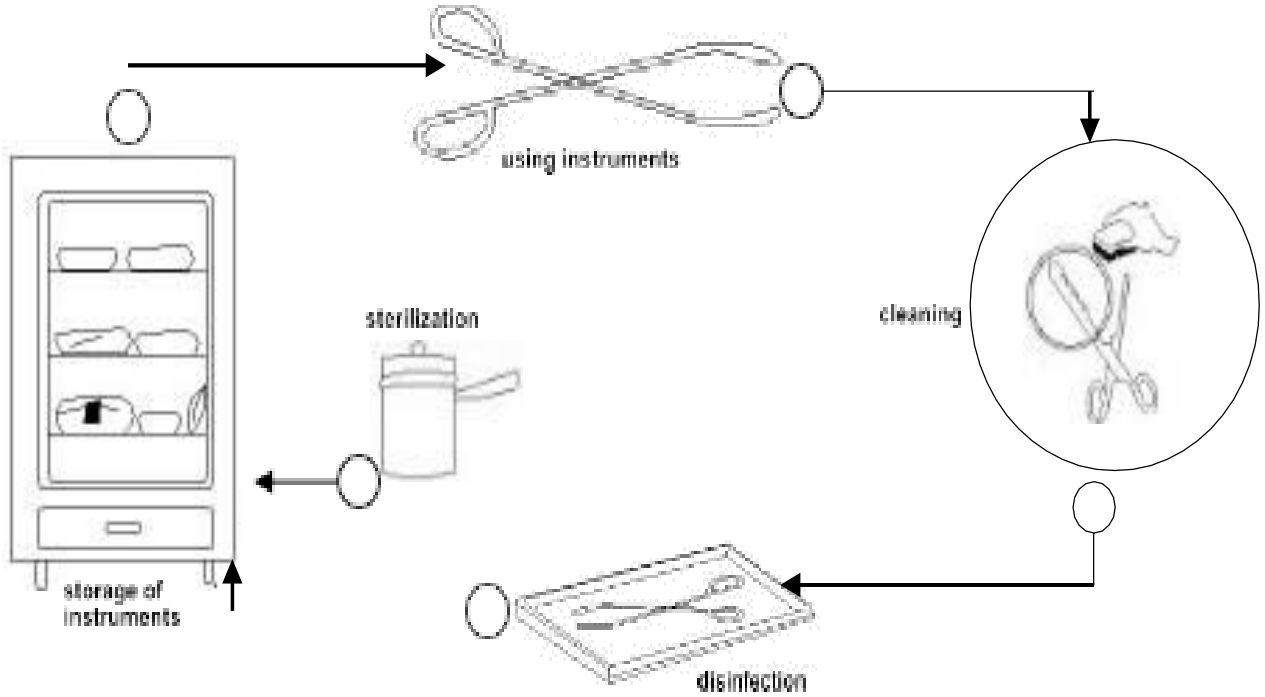
1. Follow instructions carefully
2. Make sure that chemical disinfectant touches all surfaces of the item being processed
3. When using heat, make sure to use the correct temperature, for example if boiling to achieve high level disinfection, instruments should be covered in water with a lid and timing begins for 20 mins when water begins to boil
4. Be sure all items have been thoroughly cleaned and dried

**Note**: Sterilisation and HLD will not destroy micro-organisms trapped in small particles or blood. Thorough cleaning must be done to remove these particles.

*Intermediate level disinfection*

Is carried out using chemical agents that eliminate vegetative bacteria and some bacterial spores, e.g. is sodium hypochlorite

**Figure 5: Processing instruments**




Source: Adapted from the Fiji Ministry of Health, Infection control manual for health facilities.

### 4.9.5. Sterilisation

Sterilise instruments and other items that come into contact with the bloodstream or tissue beneath the skin (surgical instruments, wound dressings). Sterilisation is the only process that destroys all forms of micro-organisms, including those that cause tetanus and gangrene. (These spore-forming micro-organisms are very hard to kill.)

*Sterilisation methods*

The most common sterilisation methods in hospitals and clinics are **steam heat** (autoclave or pressure cooker), **dry heat** (hot air oven), and **gas** (ethylene oxide).

**Steam sterilisation (autoclave, pressure cooker to be used only if autoclaves are not available)** destroys all micro-organisms on objects that are used beneath the skin (e.g. surgical instruments, gloves, needles and syringes), or those that enter sterile areas of the body (e.g. urinary catheters).

The equipment needed to steam sterilise objects include:

- Wrapping material (e.g. cotton cloth, paper)
- Metal instrument trays (with holes in bottom)
- Sterilisation indicator
- Autoclave or pressure cooker
- Heat source (electricity, stove for kerosene)
- Fuel (kerosene, wood)

Procedures for steam sterilisation are as follows.

1. Clean and dry all items to be sterilised
2. Open and separate all items before processing. For example, open all instruments (forceps, clamps), and wrap tubing around a towel or cloth and coil gently
3. Wrap items with double thickness cotton muslin cloth or paper
4. Insert proper sterilisation indicator (e.g. autoclave tape) to show that the article is sterile
5. Load packs and items in steriliser so that steam can move around packs and penetrate all surfaces
6. Sterilise items at the correct temperature and pressure and for the correct amount of time (see below). Begin timing after the desired pressure has been reached (on autoclave, check gauge; on pressure cooker, wait for pressure valve to jiggle)

7. Turn off heat source. Wait 30 minutes for steriliser to cool, then slightly open lid to let steam out
8. Allow packs to dry before you remove them. This takes 20–30 minutes
9. Remove items from steriliser
10. Allow them to cool completely before storage, or use immediately
11. Label the container with the date. Reprocess after expiration

**Table 5: Steam sterilisation**

| | |
|---|---|
| Temperature: | $121^0$ Centigrade ($250^0$ Fahrenheit) |
| Pressure : | 106 kPa |
| Time : | Unwrapped items: 20 minutes |
| | Wrapped items: 30 minutes |

Additional notes on steam sterilisation.

- **Wrap packs loosely.** Tightly wrapped packs do not allow steam to touch all surfaces of items and equipment. Where steam does not touch, items will not be sterilised
- Items that are not wrapped must be used immediately
- Wait for packs to dry before removing them from the steriliser. Micro-organisms can travel through moisture into the sterile packs
- When using a pressure cooker, all items must be at least 5 cm above the water
- When using drums, tilt them and open the lids to allow air to drain out and to be replaced by steam
- As soon as a drum is opened, all unwrapped items inside become contaminated. Therefore, items should be wrapped even when drums are used

**Table 6: Temperature and time for effective dry heat sterilisation**

| Temperature | Time |
|---|---|
| $170^0$ C ($340^0$ F) | 60 minutes (1 hour) |
| $160^0$ C ($320^0$ F) | 120 minutes (2 hours) |
| $150^0$ C ($300^0$ F) | 150 minutes (2½ hours) |
| $140^0$ C ($285^0$ F) | 180 minutes (3 hours) |
| $121^0$ C ($250^0$ F) | Overnight |

**Table 7: Sterility tests**

| **Methods** | | **Indicators** | | |
|---|---|---|---|---|
| **Agent** | **Means** | **Physical** | **Chemical** | **Bacteriological** |
| Dry heat | Flames<br><br>Hot ovens | Must be red hot<br><br>Thermometer | None<br><br>Daily check:<br>heat sensitive dyes | Monthly check:<br>Mix of spore-producing and non-spore producing bacteria |
| Humid heat (best method for hospitals) | Autoclaves, Pressure cooker (steam under pressure) | Record of:<br>Pressure<br>Temperature<br>Time (duration) | Daily check:<br>heat sensitive dyes for steam saturation | Weekly check:<br>spore test (*Bacillus stearothermophillus*) |
| Ethylene oxide | Gas | Is used to sterilise heat sensitive items which cannot withstand temps greater than 60ºC | Ethylene gas | Gas indicator. |

Note: Sterilisers should be routinely tested to make sure that they are working properly and that instruments and equipment are sterile.

**Table 8: Disinfectants and their uses on instruments and equipment**

| Disinfectant | Time | Purpose | Dilution | Comments |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| **Alcohol**<br><br>70% | 20 minutes | **Kills:**<br><br>Gram-positives<br><br>Gram-negatives<br><br>TB<br><br>HIV Hepatitis B Viruses | None | Does not need to be rinsed off |
| **Chlorine solution**<br><br>(1% available chlorine) | Decontamination<br><br>10 minutes<br><br><br>Disinfection<br><br>20 minutes | **Kills:**<br><br>Gram-negatives<br><br>TB<br><br>Most spores<br><br>Hepatitis virus<br><br>HIV Virus | See Note 2 | Make a fresh solution every day.<br><br>Rinse off with distilled water. |
| **Formaldehyde**<br><br>(8%) | 20 minutes | **Kills:**<br><br>Gram-positives<br><br>Gram-negatives<br><br>TB<br><br>Spores<br><br>Viruses | 1 part formaldehyde + 5 parts water | Prepare fresh solution every 2 weeks<br><br><br><br>Rinse off with distilled water. |
| Glutaraldehyde<br><br>CIDEX<br><br>SPORICIDIN<br><br>2% | 20 minutes | **Kills:**<br><br>Gram-positives<br><br>Gram-negatives<br><br>TB<br><br>Spores<br><br>Viruses | Read manufacturer's directions | Use in a well-ventilated area. Rinse with distilled water. Expensive. Use only for fibre-optics, endoscopes, bronchoscopes |

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

**Note 2:**Chlorine disinfectant solution preparation

Best Practices for Environmental Cleaning in Healthcare Facilities in Resource-Limited Settings (Accessed 23 April 2020)

Appendix E – Chlorine disinfectant solution preparation

Example 1 — Using Liquid Bleach

Chlorine in liquid bleach comes in different concentrations. Any concentration can be used to make a dilute chlorine solution by applying the following formula:

[% chlorine in liquid bleach/% chlorine desired] − 1 = Total parts of water for each part bleach†

† "Parts" can be used for any unit of measure (e.g. ounce, litre or gallon) or any container used for measuring, such as a pitcher.

‡ In countries where French products are available, the amount of active chlorine is usually expressed in degrees chlorum. One degree chlorum is equivalent to 0.3% active chlorine.

Example: To make a 0.5% chlorine solution from 3.5%†‡ bleach:

[3.5%/0.5%] − 1 = 7 − 1 = 6 parts water for each part bleach

Therefore, you must add 1 part 3.5% bleach to 6 parts water to make a 0.5% chlorine solution.

Example 2 — Using Bleach Powder

If using bleach powder†, calculate the amount of bleach to be mixed with each litre of water by using the following formula:

† When bleach powder is used; the resulting chlorine solution is likely to be cloudy (milky)

[% chlorine desired/% chlorine in bleach powder] × 1 000 = Grams of bleach powder for each litre of water

Example: To make a 0.5% chlorine solution from calcium hypochlorite (bleach) powder containing 35% active chlorine:

[0.5%/35%] × 1 000 = 0.0143 × 1 000 = 14.3

Therefore, you must dissolve 14.3 grams of calcium hypochlorite (bleach) powder in each litre of water used to make a 0.5% chlorine solution.

Example 3 — Formula for Making a Dilute Solution from a Concentrated Solution
Total Parts (TP) (H2O) = [% Concentrate／% Dilute] − 1
Example: To make a 0.1% chlorine solution from 5% concentrated solution.
Calculate TP (H2O) = [5.0%／0.1%] − 1 = 50 − 1 = 49
Take 1 part concentrated solution and add to 49 parts boiled (filtered if necessary) water.

(Source: AVSC International (1999). Infection Prevention Curriculum. Teacher's Manual. New York, p.267. Interim Infection Prevention and Control Guidance for Care of Patients with Suspected or Confirmed Filovirus Haemorrhagic Fever in Health-Care Settings, with Focus on Ebola [PDF – 24 pages], p. 24. https://www.who.int/csr/resources/publications/who-ipc-guidance-ebolafinal-09082014.pdf )

## 4.10. Transmission-based precautions (TBP)

Transmission-based precautions are designed for use on patients who are diagnosed with, or suspected to have, a specific infectious pathogen transmitted by contact, airborne or droplet routes. These are used in conjunction with Standard Precautions.

The application and combination of TBP depends on the infectious agent involved. Whether used singularly or in combination they are always used in addition to Standard Precautions. Table 9 provides the recommended TBP to apply for specific infectious agents/diseases.

The combination measures for additional precautions involve the following:

- Continued implementation of standard precautions
- Dedicated patient equipment
- Allocation of single rooms or cohorting of patients with the same infection
- Restricted visitors and transfer of patients
- Enhanced environmental cleaning and use of disinfectant in the patient environment

### 4.10.1. Airborne precautions

Transmission occurs when HCW's inhale particles containing the infectious agent that are disseminated in the air. Micro-organisms carried this way can be widely dispersed via air currents and can remain infectious in the environment for long periods before being inhaled by or deposited onto the susceptible host.

The following airborne precautions should be implemented:

- Patients should be placed in a negative pressure room with doors closed. If a negative pressure room is unavailable, place in a single room (doors closed) with open windows for natural ventilation, and use a fan (blowing out toward the window) to control the direction of air flow
- Particulate masks (N95) should be worn by HCWs and visitors upon entry into the room in addition to standard precautions
- Patients should be moved as little as possible out of the room, but if movement is necessary, the patient should wear an N95 mask to minimise dispersion of airborne nuclei
- A sign should be placed on the patient's door explaining the necessary precautions

### 4.10.2. Droplet precautions

Transmission occurs when droplets containing micro-organisms/infectious agents come in contact with HCW's hands and are transferred to the conjunctivae of the eye, nasal mucosa, or mouth of a susceptible person. Droplets distribution is limited by the force of expulsion and gravity (not air movement), usually one metre or less.

The following droplet precautions should be implemented:

- Surgical masks (not N95) should be worn by healthcare workers and visitors upon entry into the room in addition to standard precautions
- Patients should be kept in a single room with the closed door or cohort patients infected with the same infectious agents together in a room with good ventilation
- If the patient is transported out of the room, then they should wear a surgical mask
- A sign should be placed on the patient's door explaining the necessary precautions

### 4.10.3. Contact precautions

Contact precautions relates to:

- **Direct contact** transmission involves direct physical transfer of micro-organisms from an infected or colonised person to a susceptible host via the contaminated hands and clothing of HCW's
- **Indirect contact** transmission involves a susceptible person coming in contact with a contaminated (usually inanimate) object, such as a contaminated instrument or equipment, e.g. when patient care contaminated equipment/devices are shared between patients.

The following contact precautions should be implemented:

- HCW must wear a clean, non-sterile disposable gown and clean non-sterile gloves when they are in contact with the patient, environmental surfaces and patient care items and equipment in the patient's room in addition to standard precautions
- The patient should be kept in a single room with the closed door or cohort with other patients infected with the same pathogen
- A sign should be placed on the patient's door explaining the necessary precautions

### 4.10.4. Patient placement

Isolating patients who require TBP is very important in preventing the transmission of infection.

There should be 1–2 meters space between all patient beds to reduce the risk of cross infection. If single rooms are not available, patients with the same pathogen should be kept together in either a room or a ward. The room or ward should be in a well-defined area that is clearly separated from other patient care areas used for uninfected patients.

Other points relevant to patient placement include the following:

- Keep all patient notes and charts (vital signs, fluid balance) outside the room
- Keep doors closed
- Place clear signage outside the room
- Perform HH after leaving the room and after writing in patient charts or notes
- Restrict visitors

### 4.10.5. Preparation of the isolation room/ward

The goal in preparedness is to create a safe working environment for both clinical and non-clinical staff by ensuring the implementation of standard and transmission based precautions:

- A sign should be placed on the patient's door explaining the necessary precautions
- Remove unnecessary furniture and keep only the necessary furniture that can be easily cleaned
- Stock linen
- Stock hand hygiene products (e.g. liquid soap, alcohol-based products, paper towels)
- PPE should be available
- Sharps container should be placed inside the isolation room
- Garbage bags and bins should be placed in the isolation room
- Trolley to hold PPE Container for collection of used eye shields to be decontaminated.
- Recording sheet should be placed at the entrance of the isolation room so that staff can record the names and contacts of visitors that enter the isolation room so that contact tracing is possible if necessary

The following guidance points could be considered as minimum steps when setting up an isolation room/ward:

- If the room is air-conditioned, ensure 12 air changes/ hour and filtering of exhaust air. A negative pressure in isolation rooms is desirable for patients requiring aerosolization procedures (intubation, suction nebulisation). These rooms may have stand-alone air-conditioning. These areas should not be a part of the central air-conditioning.
- If air-conditioning is not available negative pressure could also be created through putting up 3-4 exhaust fans driving air out of the room or where there is sufficient space, natural ventilation may be followed. Such isolation ward/room should have large windows on opposite walls of the room allowing a natural unidirectional flow and air changes. The principle of natural ventilation is to allow and enhance the flow of outdoor air by natural forces such as wind from one opening to another to achieve the desirable air change per hour
- Ensure adequate supplies of PPE and HH supplies
- Doctors, nurses, non-clinical staff and paramedics posted to the isolation ward need to be dedicated and not to be allowed to work in other patient-care areas and all health staff involved in patient care should be well trained in the use of PPE
- Ensure regular cleaning and proper disinfection of common areas, and adequate hand hygiene by patients, visitors and care givers

- Visitors to the isolation facility should be restricted. For unavoidable entries, they should use PPE according to the hospital guidance, and should be instructed on its proper use and in hand hygiene practices prior to entry into the isolation room/area
- A telephone or other method of communication should be set up in the isolation room/area to enable patients or family members/visitors to communicate with nurses

### 4.10.6. Isolation Area

The isolation area should have a low risk and high risk zone. The low risk zone should include:

- A “clean” area for health workers to store consumables and supplies of PPE, stationaries, HH and medicine supplies etc
- There should be clear instructions on the flow between areas
- Restriction movement signage
- A dedicated changing space in this area allocated to PUT ON PPE

Patient isolation room or ward area is a high risk zone and should:

- Be well ventilated with an adjoining bathroom and toilet facilities
- Have HH facilities including ABHR
- Have beds separated in distance 1 meter apart (3 feet)
- Have sharps container
- Container for used linen and other contaminated waste
- Avoid sharing of equipment, but if unavoidable, ensure that reusable equipment is disinfected between
- A dedicated area for contaminated disposal of:
  - liquid and solid waste
  - storage of used linen

A dedicated area just outside the isolation room/ward to:

- TAKE OFF PPE, this must be done under the supervision of a trained buddy
- Have supplies for HH
- Have containers for contaminated and reusable PPE
- A container for decontaminating boots if necessary

**Figure 6: General principles of an isolation unit**

**General principles of an isolation unit**

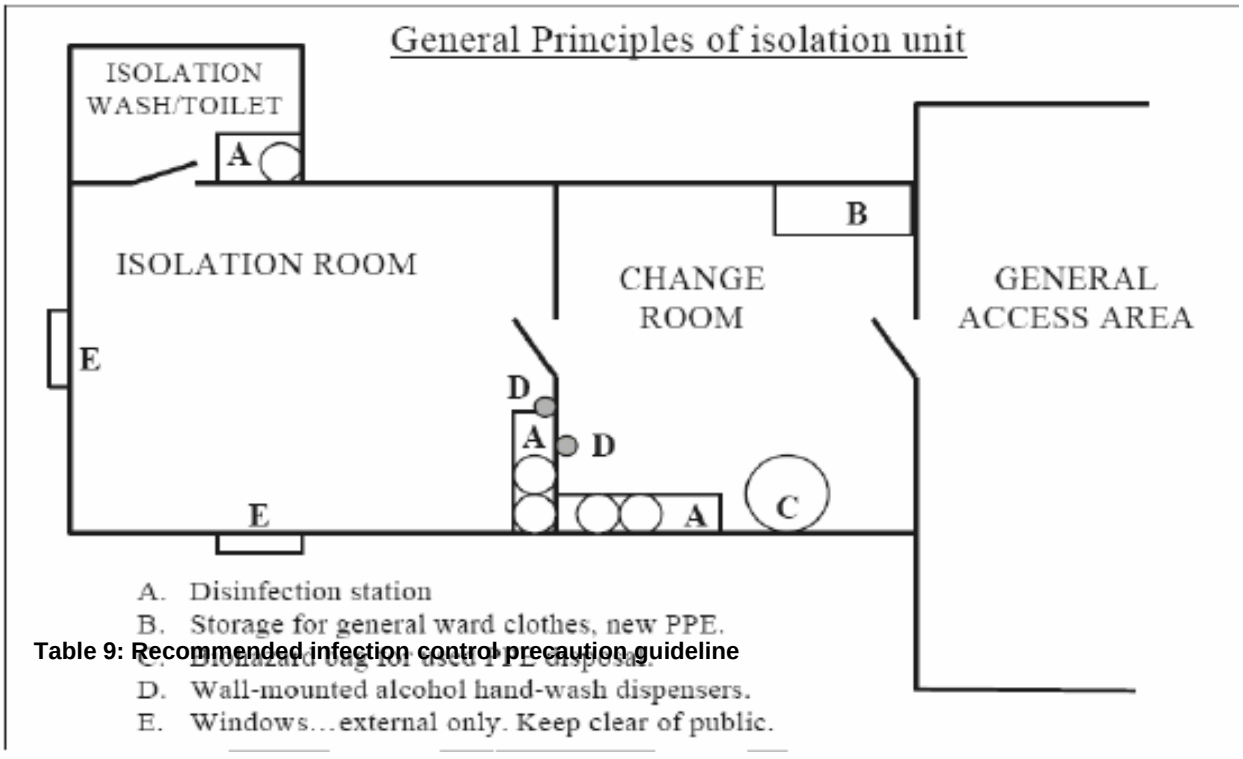



**Table 9: Recommended infection control precaution guideline**

| Isolation Type | Standard precautions | Airborne precautions | Droplet precautions | Contact precautions |
|---|---|---|---|---|
| **Diseases (examples)** | All patients<br><br>All blood,<br><br>Body<br><br>Fluids<br><br>Secretions<br><br>(except sweat), excretions and contaminated items | • TB suspect/confirmed<br>• Measles<br>• Varicella (chicken pox)<br>• SARS<br>• MDR TB<br>• Influenza (when performing procedures that are aerosol generating )<br>• COVID-19 (during aerosolising procedures) | Haemophilus influenza meningitis/ epiglottis<br><br>*Neisseria meningitides*<br><br>septicaemia/meningitis<br><br>fiphtheria (pharyngeal)<br><br>mycoplasma<br><br>(pneumonia)<br><br>Pertussis<br><br>Influenza<br><br>Parainfluenza<br><br>Mumps<br><br>Parvovirus B19<br><br>Rubella<br><br>Pneumonic plague<br><br>Group A streptococcal infections in infants and young Grup A Streptococcal pneumonia, scarlet fever in all groups viral haemorrhagic fever<br><br>Filovirus disease (Ebola and Marburg)<br><br>SARS, MERS-CoV<br><br>COVID 19<br><br>**Crimean-Congo**<br><br>**haemorrhagic fever**<br><br>**Lassa fever** | • Resistant bacteria (MRSA, VRE, *C.difficile*, RSV<br>• Herpes simplex (neonatal or mucocutaneous)<br>• Highly contagious skin infections (e.g. scabies, lice, impetigo)<br>• Herpes zoster (shingles), localised and disseminated<br>• Infants/young children (<6 years old), or any patient inconsistent with:<br>- Enterovirus<br>- Hepatitis A<br>- Rotaviral enteritis<br>- Shigella, gardia, other forms of gastroenteritis<br>• Viral haemorrhagic fever<br>• Influenza<br>• Norovirus<br>• Ebola/Marburg, Crimean-Congo haemorrhagic fever, Lassa fever<br>• SARS, MERS-CoV |
| **Single room** | No | Yes-keep door closed; If unavailable, may cohort with patients with same<br><br>organism | Yes-keep door closed<br><br>If unavailable, may<br><br>cohort with patients<br><br>with same organism | Use if possible, or cohort with patient with similar condition |
| **Negative pressure room** | No | Yes | No | No |

| | | | | |
|---|---|---|---|---|
| **Hand Hygiene** | Yes | Yes | Yes | Yes |
| **Gloves** | For body substances | See standard precautions | Yes | Yes |
| **Gown or coverall** | If soiling likely | See standard precautions | Yes | Yes |
| **Apron** | Yes | Yes | Yes | Yes |
| **Mask** | Protect face if splash likely | Yes (particulate mask N95) | Yes | See standard precautions |
| **Goggles/face shields** | Protect face if splash likely | See standard precautions | See standard precautions | See standard precautions |
| **Head cover** | Use based on risk of exposure from infectious agent | | | |
| **Special handling of equipment** | Gloves for handling equipment contaminated with blood and body fluids | See standard precautions | See standard precautions | See standard precautions |
| **Transport of patients** | Cover all patient's open wounds | Mask for patient; Notify area receiving Patient | Regular mask for patient; Notify area receiving patient | Notify area receiving patient |
| **Room cleaning** | Standard cleaning protocol | Enhance additional cleaning with disinfectant depending on micro-organism See infection control nurse | Enhance additional cleaning with disinfectant additional cleaning depending on micro-organism See infection control Nurse | Enhance additional cleaning with disinfectant depending on micro-organism See infection control nurse |

## 4.10.7. COVID 19 TBP

**Strategies to prevent or limit transmission of COVID-19 in healthcare settings** include the following:

1. Ensuring effective triage, early recognition, and source control (separating and isolating patients with suspected COVID-19).
2. Establishing a COVID-19 case definition on which to base case investigation and clinical management pathways. Develop contract tracing, line lists, patient and healthcare workerCOVID-19 surveillance processes.
3. Activation of relevant emergency response committees to ensure a coordinated approach and risk communication.

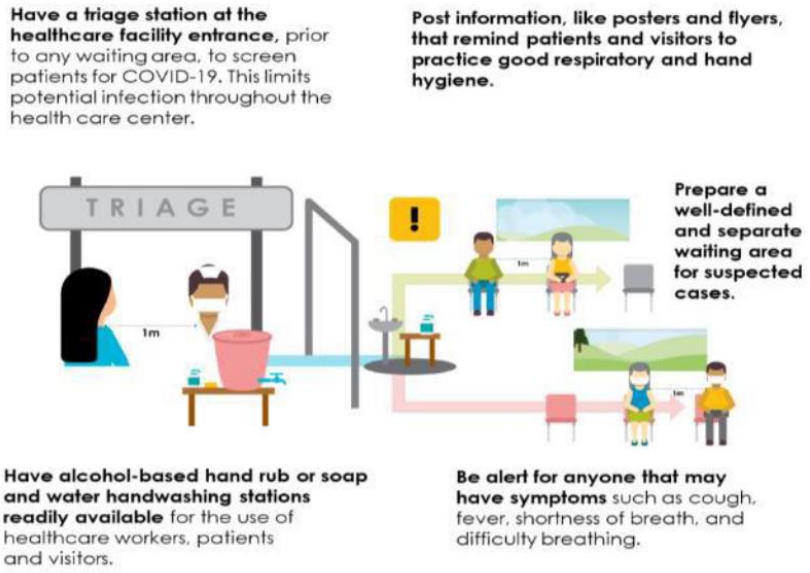
4. Applying standard precautions for all patients with an emphasis on hand hygiene, correct donning and doffing of PPE, environmental disinfection and waste management processes.
5. Implementing additional precautions (droplet and contact and, whenever applicable, airborne precautions) for suspected cases of COVID-19.
6. Implementing administrative controls to support education, risk communication and resourcing.
7. Using environmental and engineering controls to ensure quarantine and isolation facilities are fit for purpose.

**Triage, early recognition, surveillance, case identification and contact tracing**

Triage is a system for assessing all patients at presentation facilitating the early recognition of potential COVID-19 cases and the initiation of a rapid response, case investigation and contact tracing processes. Healthcare facilities need pre-triage assessment areas. The area is a filter for patients attending Outpatients Department and Emergency services. The aim is to capture any patients with significant signs and symptoms before entering the facility. These patients need to be assessed separately to the normal clinics and tested. The immediate response will be applying a medical mask to the patient and isolation of patients with suspected or confirmed disease in an area separate from other patients (source control). Decisions as to whether to admit patients or to advise them to self-isolate at home will be a local clinical decision in line with nationally agreed guidelines and protocols, and part of national COVID-19 preparedness and response plans. The pre-triage facility must have appropriate IPC procedures.

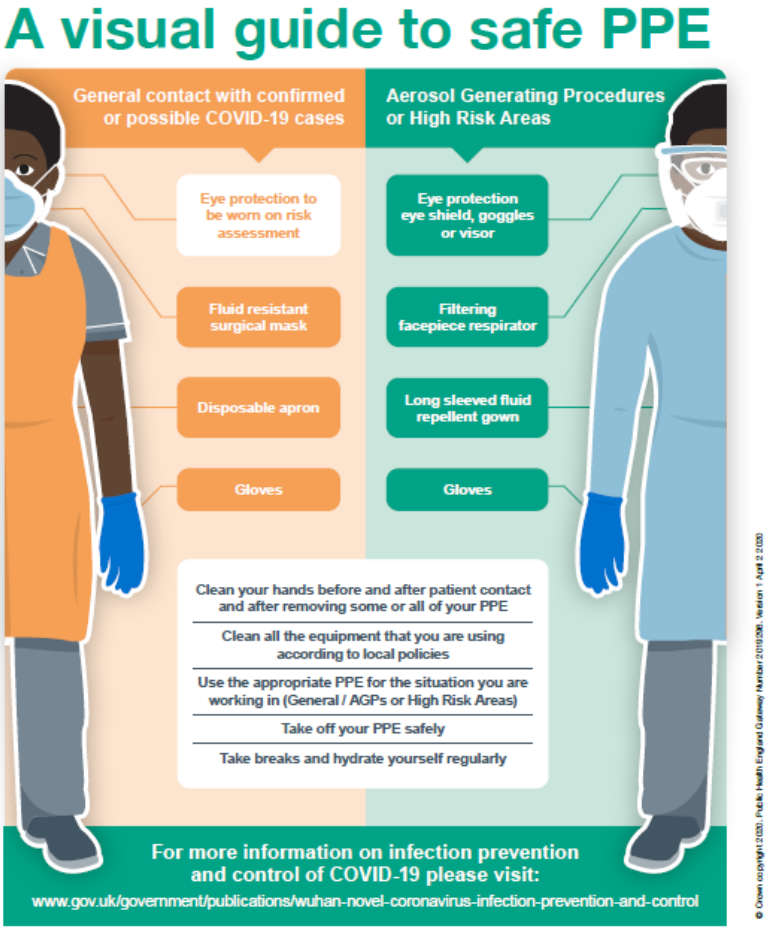
To facilitate the early identification and ongoing management of suspected COVID-19 cases, healthcare facilities need to:

- Establish well-equipped COVID-19 triage and screening stations at the entrance to the facility, which are supported by staff trained in the use of screening tools according to the updated case definition. Please refer to the WHO Global Surveillance for human infection with COVID 19 for case definitions.
- Provide healthcare workers (HCWs) with relevant education and training which support early identification and referral of suspected cases.
- Increase surveillance and reporting mechanisms for influenza like illness (ILI) and severe acute respiratory illness (SARI) at both the community clinics and tertiary health service level.
- Ensure adequate resource allocation for case investigation and contact tracing teams.
- Establish a well-equipped triage station at the entrance to the facility, supported by trained staff – see figure 1 below, adhering to IPC procedures.
- Develop country appropriate risk communication tools to display in healthcare and community settings which alert patients of the signs and symptoms of COVID-19 and how to notify healthcare workers.
- Ensure a coordinated approach to communication, reporting and evaluation of the planning and response activities are incorporated into the outbreak/pandemic response plan.




Source: Papua New Guinea Emergency Preparedness and Response Plan Coronavirus disease 2019 (COVID 2019)

Standard precautions should be practiced for suspected or confirmed COVID-19 patients in accordance with the procedures outlined in Chapter 4. The type of PPE used when caring for people with COVID-19 will vary according to the setting, type of personnel and activity. Healthcare workers involved in the direct care of patients should use gowns, gloves, medical masks and eye protection (goggles, face shields). The diagram below shows a visual guide to safe PPE.




**Contact and droplet precautions**

- in addition to using standard precautions, all individuals, including family members, visitors and HCWs (healthcare workers), should use contact and droplet precautions before entering the room of suspected or confirmed COVID-19 patients;
- patients should be placed in adequately ventilated single rooms. For general ward rooms with natural ventilation, adequate ventilation is considered to be 60 L/s per patient;
- when single rooms are not available, patients suspected of having COVID-19 should be cohorted;
- all patients' beds should be placed at least 1 metre apart regardless of whether they are suspected to have COVID-19;
- where possible, a team of HCWs should be designated to care exclusively for suspected or confirmed cases to reduce the risk of transmission;
- HCWs are to don appropriate PPE for droplet and contact precautions. The use of boots and coveralls is not required during routine care;
- after patient care, appropriate doffing and disposal of all PPE and hand hygiene should be carried out as per Section 4.2.
- PPE is to be changed between patient care, unless extended use of PPE processes are adopted (Annex 5).
- equipment should be either single-use and disposable or dedicated equipment (e.g. stethoscopes, blood pressure cuffs and thermometers). If equipment needs to be shared among patients, clean and disinfect it between use for each individual patient (e.g. by using ethyl alcohol 70%) or another approved disinfectant as per manufacture instructions.

- HCWs should refrain from touching eyes, nose, or mouth with potentially contaminated gloved or bare hands.

**Transportation of Patients**

- avoid moving and transporting patients out of their room or area unless medically necessary. Use designated portable X-ray equipment, if available, or other designated diagnostic equipment. If transport is required, use predetermined transport routes to minimize exposure for staff, other patients and visitors, and have the patient wear a medical mask.
- ensure that HCWs who are transporting patients perform hand hygiene and wear appropriate PPE as described in this section.
- notify the area receiving the patient of any necessary precautions as early as possible before the patient's arrival.
- routinely clean and disinfect surfaces with which the patient is in contact.

**Additional airborne precautions required for aerosol-generating procedures.**

Aerosol-generating procedures, such as tracheal intubation, non-invasive ventilation, tracheotomy, cardiopulmonary resuscitation, manual ventilation and bronchoscopy, have been associated with an increased risk of transmission of coronaviruses.

Considerations for performing aerosol-generating procedures:

- identify an adequately ventilated room or designated room or area to conduct aerosol-generating procedures. This may be a room with natural directional ventilation towards the outside of the room to areas of low traffic; in a room with air flow of at least 160 L/s per patient or in negative-pressure rooms with at least 12 air changes per hour and controlled direction of air flow;
- use a certified N95 or P2 respirator mask and conduct seal check, note that facial hair (e.g. a beard) may prevent a proper respirator fit.
- •use eye protection (i.e. goggles or a face shield);
- wear a clean, non-sterile, long-sleeved gown and gloves. If gowns are not fluid resistant, HCWs should use a waterproof apron for procedures expected to create high volumes of fluid that might penetrate the gown; and
- limit the number of persons present in the room to the absolute minimum required for the patient's care and support.

# Chapter 5: SPECIAL HEALTHCARE AREAS

Some areas of a healthcare facility require very specific Infection Prevention Control measures because of heightened risk of infection or because of the specific nature of the work undertaken.

This section covers:

- Operating theatres
- Laboratories
- Maternity units – labour suites
- Mortuaries

## 5.1. Operating theatres

Operating theatres should be located away from areas of the healthcare facility that are heavily travelled by staff and patients. Enclose the operating theatre to minimize dust, eliminate insects, and facilitate sterility and an environment conducive to the prevention of patient and healthcare worker infections. Surgical site infections are common and can be prevented based on standards of pre-, intra-, and post-operative care. Healthcare worker infections such as the acquisition of blood borne viruses can be prevented by safe practices in the operating theatre.

The following preconditions for the prevention of healthcare-associated infections (HAI) should be addressed by healthcare facility (HCF) leaders and managers, informed by the evidence-based information provided:

- Infrastructure/system change: access to the right equipment and supplies including PPE, and an operating theatre environment that is designed and planned to facilitate patient and healthcare (HCW) worker safety
- Training and education: a program of routine training and education and periodic retraining for all personnel involved in operating theatre work that is in line with the recommendations presented in this chapter
- Personnel should receive initial and ongoing education and competency validation as applicable to their roles
- Monitoring, evaluation and feedback: a program of regular monitoring, supervision, and feedback is in place
- Awareness raising/promotion: the practices described in the chapter are reinforced through awareness raising (e.g. use of posters displayed in the theatre areas)
- Safety culture: managers and leaders at every level of the HCF show their visible support for operating theatre safety to help develop and reinforce a culture of patient safety
- Policies and procedures should be developed, reviewed periodically, revised as necessary, and readily available in the practice setting

It is essential that the number and flow of visitors, patients, clients and staff should be regulated and kept to absolute minimum in the following areas of HCF:

- Preoperative and Recovery rooms i.e. areas where patients wait and where healthcare workers (HCW) examine and treat patients prior to and after being operated
- Operating theatres
- Procedure rooms where minor operations are performed, including their preoperative and recovery rooms
- Sterile Service Departments or areas designated for the decontamination of surgical instruments
- Storage areas for clean items/equipment and sterile instruments

Other standards are vital for safe operating environments and optimum patient outcomes, these include; PPE, hand decontamination (scrubbing), cleaning schedules, appropriately trained staff, storage and lay up of sterile equipment, ventilation (airflow), designated zones in the OT area, and reporting systems for any incidents.

## Minor operation

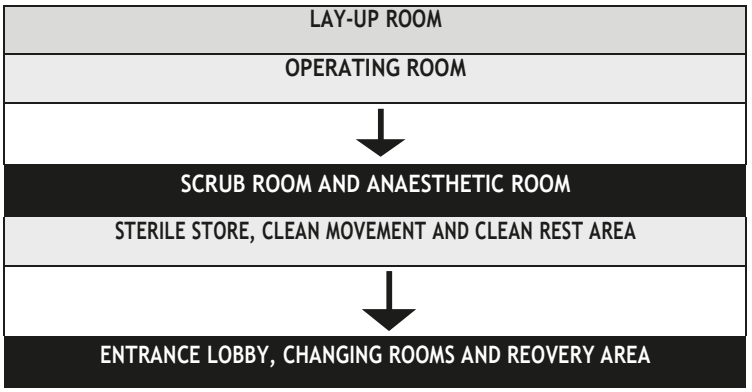
The following applies to areas where minor medical procedures are performed on patients:

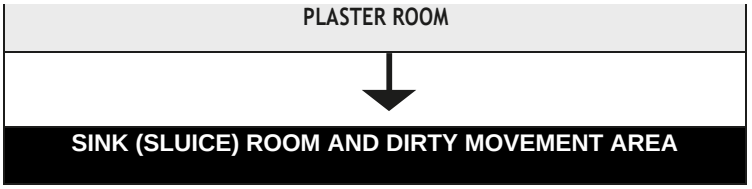
- Permit only the patient and staff performing and assisting with procedures in the procedure room
- The number of trainees should be kept to a maximum of two trainees per room
- Patients should wear clothing provided by the health-care facility if not available they may wear their own clean clothing (freshly laundered)
- Procedures should be performed adhering to the same sterility standards as operating theatres for optimal patient outcome and HCW safety
- Environmental cleanliness and equipment sterility should be ensured (see subsequent sections)

### 5.1.1. Operating theatre areas

The OT is routinely divided into four designated areas according to its descending order of cleanliness, from clean to dirty.

**Figure 1: Operating theatre areas in the descending order of cleanliness**






(Source: Damani NN. Manual of Infection Prevention and Control. Oxford: Oxford University Press, 2012.)

The absolute minimum requirement for safe operating is; an area to scrub in preparation for surgery, this should be separated by a partition from the main theatre. The main theatre must be a well-ventilated clean, clutter free, only essential operating and resuscitation equipment, with clear designated areas of work to reduce contamination in critical (clean) areas of the theatre.

There should be clearly demarcated, separate areas for instrument cleaning and sterilization and stored sterile instruments.

Environmental controls and the use of surgical attire increase as staff move from unrestricted areas. Staff with respiratory or skin infections or uncovered open sores should never be allowed to work in any area of the surgical unit.

**Table 1: Theatre layout and examples of room locations**

| Unrestricted | Semi-restricted | Restricted | Dirty |
|---|---|---|---|
| Patient reception<br>This area includes a central control point for designated personnel to monitor the entrance of patients, personnel and materials | The peripheral support areas of the surgical suite | Accessible only through a semi-restricted area<br>Operating theatres | Disposal area<br>All utilised material and linen are gathered, packaged and sent to appropriate areas |
| Locker rooms<br>Lounges<br>Offices | Clean storage and equipment rooms<br>Scrub area<br>Recovery room | Sterile supply<br>Storage area<br>Linen<br>Anaesthetic workroom | Excised/amputated human parts/organs are gathered, packaged and sent to appropriate area |

## Operating theatre environment

*Ventilation and temperature controls:*

- Maintain operating theatres at positive pressure so that air flows from the cleanest areas to the least clean areas
- Maintain positive pressure ventilation with respect to corridors and adjacent areas
- Maintain a good ventilation

- Keep the temperature of the operating theatre between (68°F–75°F [20°C–23°C])
- Design operating theatres to introduce air at the ceiling with the exhaust near the floor
- If the operating theatre is not equipped with a positive-pressure system, focus on less expensive strategies, such as:
  - Keeping doors and windows closed
  - Keeping personnel to a minimum during a procedure and restrict personnel once the operation has started (unless it is absolutely essential)
  - Absolutely minimizing talking, moving, and opening and closing of doors

*Cleaning:*

- Clean the operating theatre between each patient, and at the beginning and end of each day
  - Always keep operating theatres clean, dry and dust free
  - Avoid unnecessary clutter to aid cleaning
- Do not clean any instruments in the operating theatre after an operation but rather send it to the designated decontamination area or the Sterile Supply Department
- Keep floors smooth, slip resistant and robust enough to withstand frequent washings and harsh cleaning/scrubbing
- Ensure that walls are water-impermeable, scrub able, and resistant to cracks
  - Walls should also be protected from impact by gurneys and other equipment coming to and from the operating theatre department
- Ensure that ceilings in operating theatres are smooth, washable, and made of a solid surface free from cracks and crevices
- Seal all ceiling-mounted lights or fixtures so that dust and contaminants cannot enter through these openings and so that there is no compromise to the ventilation system
- It is permissible to use lay-in ceilings in semi-restricted and unrestricted areas, including recovery and holding areas; however, lay-in ceilings are not permitted in operating theatres
- The theatre should be free of all items other than the equipment necessary to perform the surgical procedures. There should be no clutter

*Instrument sterilisation and storage:*
The decontamination unit should be one-way flow from dirty to disinfected / sterile The clean and dirty areas should be clearly demarcated. Decontaminated instruments should be stored in a clean dry area, appropriately packaged and sealed to prevent contamination prior to use.

### 5.1.3. Preparation of the patient

Surgical antibiotic prophylaxis: It is essential that each healthcare facility develop local surgical antibiotic prophylaxis policy based on international guidelines. Antibiotic prophylaxis should be considered for:

- clean surgery involving the placement of a prosthesis or implant
- clean-contaminated surgery
- contaminated surgery
- surgery on a dirty or infected wound (requires antibiotic treatment in addition to prophylaxis)

The antibiotics selected for prophylaxis must cover the expected pathogens for that operative site. Narrow spectrum, less expensive antibiotics should be the first choice for prophylaxis during surgery. A single dose of intravenous antibiotic with a long enough half-life to achieve activity throughout the operation is recommended and this should be given within 60 minutes before the skin is incised. Prolonging of antibiotic prescription should be avoided during the post-operative period in the absence of an infection.

- *Preoperative shaving:* Hair should not be removed at the operative site unless the presence of hair will interfere with the operation. Preoperative shaving especially with a razor should be avoided because shaving can cause small nicks and breaks, leaving the skin bruised and traumatized, increasing the risk of colonization and infection. If hair is to be removed from the operative site, only the area needing to be incised should be shaved.
  If hair removal is necessary, use clippers: use of a razor must be avoided. Removal of hair, if necessary, should be done immediately before surgeons perform the incision, not the night before surgery.
- *Preoperative showers:* It is preferable that the patient has been instructed to shower or bathe the night before an operative procedure.
- Sterile drapes should be applied after proper asepsis which must be maintained throughout the surgical procedure.

- The patient identity (e.g. name and date of birth) and allergy status should be confirmed, along with any other risk factors (e.g. risk of significant bleeding), and the site of the surgery should be marked.

| | |
|---|---|
| **CLASS I/CLEAN:** | **An infected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital, or uninfected urinary tract is not entered. In addition, clean wounds are primarily closed and, if necessary, drained with closed drainage. Operative incisional wounds that follow non penetrating (blunt) trauma should be included in this category if they meet the criteria.** |
| **CLASS II/CLEAN-CONTAMINATED** | **An operative wound in which the respiratory, alimentary, genital, or urinary tracts are entered under controlled conditions and without unusual contamination. Specifically, operations involving the biliary tract, appendix, vagina, and oropharynx are included in this category, provided no evidence of infection or major break in technique is encountered.** |
| **CLASS III/CONTAMINATED** | **Open fresh accidental wounds. In addition, operations with major breaks in sterile technique (e.g. open cardiac massage) or gross spillage from the gastrointestinal tract, and incisions in which acute, no purulent inflammation is encountered are included in this category.** |
| **INFECTED** | **Old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection perforated viscera. This definition suggests that the organisms causing post-operative infection were present in the operative field before the operation** |

### 5.1.4. Preparation of the surgical team

It is important to reduce to a minimum the level of resident and transient flora on the hands and forearms prior to performing any surgical procedure. The purpose of antiseptic solutions such as Chlorhexidine gluconate or iodophors is to reduce the microbial load significantly and suppress regrowth for as long as possible thus reducing the risk of contamination at the operating site.

*Surgical hand scrub*

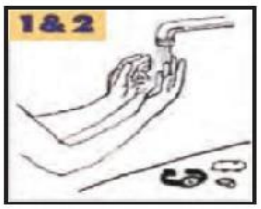
Proper surgical hand scrubbing for 3-5 minutes and the wearing of sterile gloves and a sterile gown provide the patient with the best possible barrier against pathogenic bacteria in the environment and against bacteria from the surgical team. A surgical hand decontamination (scrub) should be undertaken before every invasive procedure.

To ensure effective surgical hand decontamination (scrub):

- Hands must be well cared for, any abrasions covered with water resistant dressings and nails must be clean and kept short. False nails or nail polish should not be worn
- Nail brushes should not be used, they can actually raise the bacterial count
- All jewellery should be removed before entering the scrub area. Wearing of jewellery, including earrings, watches, and rings, encourages persistence of high bacterial counts on skin surfaces
- Staff should wear short sleeved shirts / scrubs to allow thorough decontamination of the forearms

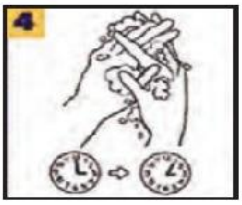
If antiseptic solution is not available, antiseptic soap should be used (see Fig 2 for procedure). Running water is preferred; however, when no running water is available, use a bucket with a tap that can be turned off, to lather hands, and turned on again (by a buddy) for rinsing, or use a buddy to pour the water with a scoop.

**Figure 2: Surgical hand scrub procedure (antiseptic solution and water)**



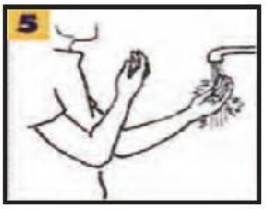

1. Remove jewelry and watch. Wedding rings harbour bacteria and must be removed when scrubbing, whenever possible
2. Hold hands above the level of the elbow and wet hands thoroughly


3. Keep short nails at all the time **DO NOT use scrubbing brush**

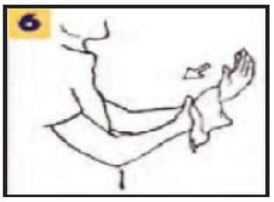



4. Holding your hands up above the level of your elbow, apply the antiseptic liquid.
5. Wash following the 7 steps for hand hygiene
6. Thoroughly wash the wrists and forearms moving from the hand to the elbow

Continue washing in this way for 3-5 minutes




7. Rinse each arm separately, fingertips first, holding your hands above the level of your elbow. Do not let rinse water flow over clean area. Water should flow from area of least contamination to area of most contamination




8. Using a sterile towel, dry your hands and arms thoroughly– from fingertips to elbow - using a different side of the towel on each arm

Surgical hand antisepsis - antiseptic handwash or antiseptic handrub


9. Keep your hands above the level of your waist and do not touch anything before putting on sterile gown and gloves

- Contact with soiled objects contaminates clean hands. The area below the level of the waist is considered unclean
- Handwashing - action of performing hand hygiene for the purpose of
- physically or mechanically removing dirt, organic material, and/or microorganisms

*Surgical hand scrub with ABHR*

Several ABHR have been licensed for use as preoperative surgical hand preparations. The antimicrobial efficacy of ABHR formulations is superior to all other currently available products. It is essential that before applying ABHR, the hands of the surgical team should be cleaned upon entering the operating theatre by washing the hands with soap and running water. To optimise the efficacy of ABHR for surgical scrub it is essential that:

- Before applying ABHR, hands must be completely dry (See Fig. 3 below)
- When applying ABHR, hands should be wet from the alcohol based rub during the whole procedure, which requires approximately 15 mL (depending on the size of the hands) and requires a total of 3 minutes

Use of an ABHR for surgical hand disinfection has several advantages over antiseptic solution and water which include; rapid action, time saving, fewer side effects, and non-risk of recontamination by rinsing hands with water.

**Figure 3: Surgical hand scrub with ABHR**

The handrubbing technique for surgical hand preparation must be performed on perfectly clean, dry hands.
On arrival in the operating theatre and after having donned theatre clothing (cap/hat/bonnet and mask), hands must be washed with soap and water.
After the operation when removing gloves, hands must be rubbed with an alcohol-based formulation or washed with soap and water if any residual talc or biological fluids are present (e.g. the glove is punctured).

Surgical procedures may be carried out one after the other without the need for handwashing, provided that the handrubbing technique for surgical hand preparation is followed (Images 1 to 17).

1

Put approximately 5ml (3 doses) of alcohol-based handrub in the palm of your left hand, using the elbow of your other arm to operate the dispenser

2

Dip the fingertips of your right hand in the handrub to decontaminate under the nails (5 seconds)

3

Images 3–7: Smear the handrub on the right forearm up to the elbow. Ensure that the whole skin area is covered by using circular movements around the forearm until the handrub has fully evaporated (10-15 seconds)

4

See legend for Image 3

5

See legend for Image 3

6

See legend for Image 3

7

See legend for Image 3

8

Put approximately 5ml (3 doses) of alcohol-based handrub in the palm of your right hand, using the elbow of your other arm to operate the dispenser

9

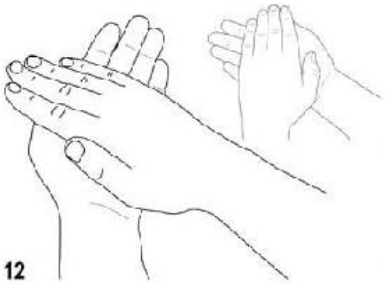
Dip the fingertips of your left hand in the handrub to decontaminate under the nails (5 seconds)

**10**

Smear the handrub on the left forearm up to the elbow. Ensure that the whole skin area is covered by using circular movements around the forearm until the handrub has fully evaporated (10-15 seconds)

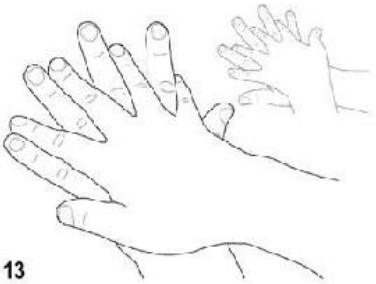
**11**

Put approximately 5ml (3 doses) of alcohol-based handrub in the palm of your left hand, using the elbow of your other arm to operate the distributor. Rub both hands at the same time up to the wrists, and ensure that all the steps represented in Images 12-17 are followed (20-30 seconds)



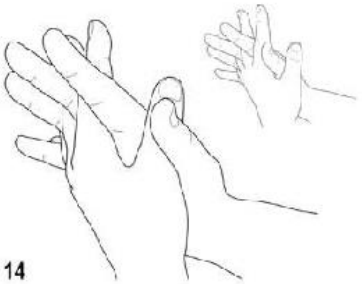
**12**

Cover the whole surface of the hands up to the wrist with alcohol-based handrub, rubbing palm against palm with a rotating movement



**13**

Rub the back of the left hand, including the wrist, moving the right palm back and forth, and vice-versa

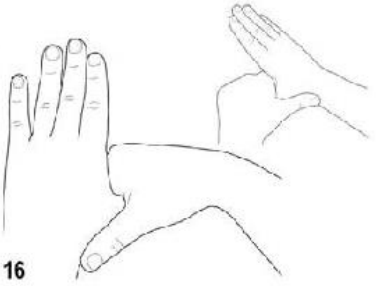


**14**

Rub palm against palm back and forth with fingers interlinked

**15**

Rub the back of the fingers by holding them in the palm of the other hand with a sideways back and forth movement



**16**

Rub the thumb of the left hand by rotating it in the clasped palm of the right hand and vice versa

**17**

When the hands are dry, sterile surgical clothing and gloves can be donned

Repeat the above-illustrated sequence (average duration, 60 sec) according to the number of times corresponding to the total duration recommended by the manufacturer for surgical hand preparation with an alcohol-based handrub.

*Personal protective equipment (theatre attire)*

- PPE is designed to minimize the transfer of microorganisms from the mucous membranes, skin and hair of the surgical team to the patient
- PPE provides the surgical team with some protection from the patient
- It is recommended that perioperative personnel in the semi-restricted and restricted areas wear facility-provided, clean, freshly laundered, or disposable surgical scrub attire
- When in the restricted areas, all non-scrubbed personnel should completely cover their arms with a long-sleeved scrub top or jacket (facility may require this in semi-restricted area as well)
- Perioperative personnel should change into surgical attire in designated dressing areas to decrease the possibility of cross-contamination
- Scrub attire and cover apparel (e.g., lab coats) should be laundered as per facility guidelines after each daily use and when contaminated
- Personnel should change back into street clothes if they need to leave the facility or travel between buildings in order to prevent contaminating the surgical attire through contact with the external environment

Gloves: Sterile gloves of good quality and the correct fit/size must be worn

Disposable hats/hoods: Should completely cover the hair (including facial hair and sideburns) and must be worn when entering the semi-restricted and restricted area. This is particularly important for arthroplasty/prosthetic implant surgery.

Masks: Scrub team must wear surgical masks to completely obscure the mouth and nose. They should be removed by the tapes and discarded at the end of each case. Masks must be removed prior to leaving the theatre suite. High efficiency masks e.g. N-95 masks (fluid repellent) must be available in theatre for procedures where there is a risk of exposure to TB or other airborne pathogens.

Eye Protection: Full face shields/visors or protective goggles must be available for all staff and must be worn during invasive procedures that potentially generate splashing. Face shields/visors, goggles should either be disposable or decontaminated according to manufacturer's instructions after use. If magnifying loupes are available, visors cannot be used. Loupes should, therefore, be fitted with side shields.

Scrub gowns: The scrub team should either wear disposable fluid repellent gowns or reusable gowns that are provided by the organization and returned for laundering.

Footwear: Staff should wear closed toe non-slip footwear. Boots should be worn if there is a high risk of heavy blood/body fluid loss. Staff should not leave the operating theatre wearing shoes that are visibly stained.

Use of Cover gowns: Use of cover gowns can be determined using a risk assessment. Cover gowns have been found to have little or no effect on reducing contamination of surgical scrubs but if used, should be laundered daily.

### 5.1.5 Before surgical procedures

Before surgical procedures, set up the operating theatre as follows:

- Organize Mayo and ring-stand tables side by side in an area away from the traffic pattern and at least 45 centimetres from walls, cabinets, and other non-sterile surfaces
- Cover the Mayo stand and other non-sterile surfaces that are to be used during the procedure with a sterile towel or cloth
- Check and set up suction, oxygen, and anaesthesia equipment
- All theatre personnel should be clear on their roles and responsibilities
- Make sure that a clean sheet, a canvas, and arm-board covers are available, if required (place them on the operating theatre table)
- Make sure that supplies and packages that are ready to open are placed on the tables (not on the floor)

- Ensure that the operating theatre has:
  - A leak-proof covered waste container with appropriate bin liner for contaminated waste items

- A puncture-resistant container for the safe disposal of sharps at the point of generation that does not contaminate the sterile field
- A leak-proof covered container for soiled linen away from sterile items

- All sterile items to be used during an operative procedure must be opened in a manner so as to avoid any possible contamination to prevent surgical infections
- Sterile items must be covered with sterile drape when not in use to avoid contamination

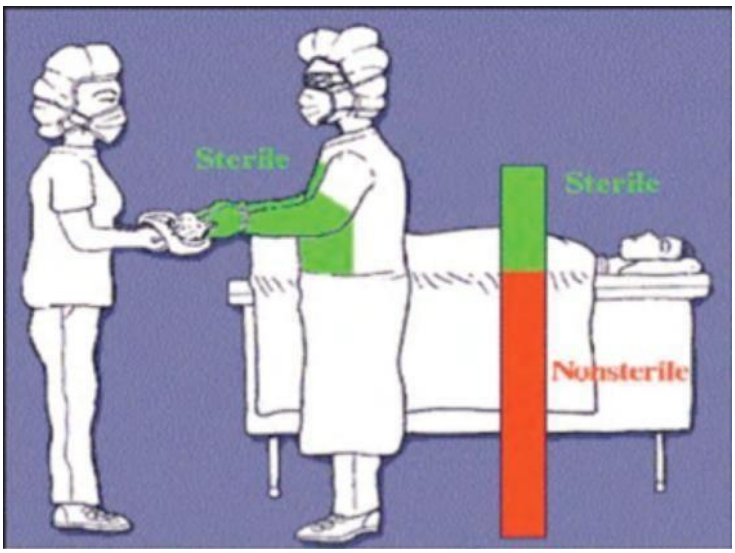
### 5.1.6. During surgical procedures

- Scrubbed staff should wear full surgical attire i.e., scrub suits, plastic aprons, clean caps and masks, protective eyewear, clean and closed theatre shoes, and sterile surgical gloves
- Scrubbed staff should keep their arms and hands within the operative field at all times
- Non-scrubbed staff should wear surgical attire (i.e. caps, clean and closed theatre shoes), protective eyewear; and mask
- Non-scrubbed staff should stay at the periphery of the operating theatre
- Blood or body fluid spillages should be absorbed with towels, preferably disposable, and cleaned
- Maintain the patient's temperature above 36o C (excluding cardiac surgery)
- Patients who are diabetic should have their blood glucose levels at <11mmols/lt
- Patients' haemoglobin (Oxygen) saturation should be maintained above 95%
- At the end of the surgery, the wound site should be covered by a sterile dressing
- Accurate records must be kept of the surgical proceedings, (e.g., instruments/equipment used, medications ad- ministered)

*Creating and maintaining a sterile field:*

- A sterile field is an area created by placing sterile towels or surgical drapes around the procedure site and on the stand that will hold sterile instruments and other items needed during the procedure
- Only sterile objects and personnel dressed in sterile attire should be allowed within the sterile field
- A properly gowned and gloved provider's sterile area extends from the chest to the level of the sterile field
- Areas below the level of the draped patient are considered non-sterile
- Only sterile items are free of potentially harmful microorganisms
- Once a sterile object comes in contact with a non-sterile object, person, dust, or other airborne particles, the object is no longer considered sterile

**Figure 4: Maintaining a sterile field**




If even one non-sterile object or person enters the sterile field, the field is no longer sterile (e.g., sterile objects become contaminated if the object is touched with a bare hand, if the object comes in contact with dust or other airborne particles, or if the object is held below the level of the sterile field).

*Place only sterile items within the sterile field:*

- The edges of a package containing a sterile item are considered unsterile
- Do not contaminate sterile items when opening, dispensing, or transferring them
- Consider items located below the level of the draped patient to be unsterile
- Do not allow non-sterile personnel to reach across the sterile field or to touch sterile items
- Open, dispense, and transfer items without contaminating them
- Do not place sterile items near open windows or doors
- Recognize and maintain the service provider's sterile area
- If a sterile barrier has been wet, cut, or torn, consider it contaminated
- Be conscious of where your body is at all times, and move within or around the sterile area
- When in doubt about whether something is sterile, consider it contaminated

*If your gloves become contaminated:*

- Stop whatever you are doing and step away from the sterile field
- Promptly change a glove punctured during an operation and rinse your hand with antiseptic or re-scrub if the glove has leaked during the puncture
- If your ungloved hands are soiled with blood or other matter, perform surgical hand scrub and put on new sterile gloves and new sterile gown

*To avoid contaminating solutions:*

- Never leave cotton balls, cotton wool, or gauze sponges soaking in antiseptic solutions
- Repeated dipping of forceps or fingers into the container to pick up the items will contaminate the solution and the items
- Never dip cotton or gauze into the main antiseptic container- instead either:
    - Pour the amount of antiseptic needed into a small container and dip the cotton or gauze into it - Discard any antiseptic remaining in this container after use for each patient, or
    - Pour the antiseptic from the container directly onto the cotton or gauze, making sure not to touch the lip of the container with the cotton or gauze

*Avoid administering the wrong solution/medication during a procedure:*

- Label the solution container (e.g., if pouring a solution into a basin, label the basin with name and concentration of solution, if indicated)
- Dispose of solution at end of the case; do not save any contaminated solution for the next case
- Any medication to be delivered to the sterile field should be identified verbally by the circulator nurse with the label shown to the scrubbed person for confirmation

### 5.1.7 Theatre cleaning

*Preparation of the operating theatre before the first case:*

- All horizontal surfaces (e.g., furniture, surgical lights, equipment) should be damp-dusted with a clean, lint-free cloth moistened with 0.05% hypochlorite solution
- Equipment from areas outside of the operating theatre should be cleaned (e.g. with lint free cloth moistened in 0.05% hypochlorite solution before being brought into the operating theatre
- Equipment that cannot be cleaned should not be brought into the operating theatre

*Between case cleaning:*

- After the procedure ends and the patient has exited the room, the following personnel and areas are considered contaminated:
    - Members of the sterile team, all furniture, anaesthesia equipment, the floor immediately surrounding the focus area or patient area, and patient transport carts
    - Furniture and equipment that are visibly soiled should be cleaned with soap and water followed by disinfection with 0.05% hypochlorite solution following each procedure
    - Walls, doors, and surgical lights and ceilings should be cleaned if soiled with blood, tissue, or body fluids
- Anaesthesia equipment should be cleaned according based on the good practice international guidelines

- Floors that are visibly soiled must be cleaned using a new or freshly laundered mop head with soap and water followed by 0.05% hypochlorite solution
- Mechanical friction should be used when cleaning, the efficacy of the cleaning is dependent on the scrubbing action

*Terminal cleaning:*

- At the end of each day, thoroughly clean operating theatres- even if they have been cleaned between cases
- Terminally clean operating theatres in which procedures may be performed, regardless of use, every 24-hour period during the regular work week
- Terminally clean scrub/utility areas daily during the regular work week
- Clean and disinfect all exposed surfaces, including wheels and casters, of all equipment (e.g., foot pedals, kick buckets, telephones, light switches, push plates, Mayo stands, handles on cabinets, vents, walls, etc.)
- Place a special emphasis on cleaning and disinfecting high/hand touch surfaces
- Clean and disinfect the floor with a wet vacuum or single-use mop, moving equipment around the room to clean the floor underneath

### 5.1.8 Maintenance staff and other visitors

- Any visitors to the operating theatre must report to reception or the person in charge prior to entering the operating theatre complex
- Theatre staff will advise on the appropriate dress code required, per hospital policy

### 5.1.9 Waste

- All clinical waste should be placed in biohazard waste bags
- Biohazard waste bags should not be filled greater than 3/4 full and should be secured/tied to ensure an effective seal
- Heavily contaminated waste should be placed in double biohazard waste to prevent leakage
- Human body parts should be placed in an approved receptacle
- Sharps boxes must be used for all metal ware
- All suction equipment including liners must be changed in-between patients to prevent cross infection and fluid loss volume management in the container

### 5.1.10. Linen

- Contaminated linen must be placed in approved receptacle and sent for laundering
- Contaminated theatre clothes must be changed at the end of the case, bagged and sent to the laundry

## Managing TB patients in OT

- Elective surgery on infectious TB patients should be postponed until such patients have received adequate drug therapy
- If emergency surgery is indicated, schedule the TB patient as the last surgical case to provide maximum time for adequate ACH (ventilation of the theatre), and allow terminal cleaning of the operating theatre
- Operating theatre personnel should use a fluid repellent respirator mask (e.g., N-95)
- Keep the operating theatre door closed after the patient is intubated, and allow adequate time for sufficient ACH to remove 99% of airborne particles (for rooms with 15 ACH, 18 minutes are required to achieve 99% removal of airborne particles)
- Extubate the patient in the operating theatre or allow the patient to recover in an airborne infection isolation (AII) room rather than in the regular open recovery facilities
- If AII room is not available, recover the patient in a well ventilated private room.
- Breathing circuit filters with 0.1–0.2 µm pore size (if available) can be used as an adjunct infection control measure

### 5.1.12 After surgical procedures

After each surgical procedure, staff wearing utility gloves should clear the operating theatre:

- Collect all waste in closed, leak-proof containers and remove them from the room
- Close and remove puncture-resistant containers when they are three-quarters full
- Remove soiled linen, soiled instruments and equipment, and supplies that have been opened, but not used, in an enclosed cart for reprocessing

## 5.2. Clinical laboratories

Laboratory workers who handle blood or potentially infected body fluids are at risk of accidental injury or exposure to infectious material. Individuals working in clinical laboratories or research units that isolate or handle pathogenic microorganisms, such as microbiology, biochemistry, haematology, and histopathology/tissue pathology laboratories, are at risk of exposure to pathogens that may cause infection. Dependent on the microorganisms involved, this may range from asymptomatic or mild infection to life-threatening illness. The World Health Organization classifies infective microorganisms into four groups, depending on the level of risk they pose to humans.

Laboratory personnel and health care facility managers must be aware of the importance of laboratory safety. Adherence to standard precautions, primary barriers and secondary barriers are necessary to minimize the risk of laboratory-acquired infections and to promote a safe environment for all workers in the laboratory and elsewhere. This section covers specific IPC activities and is not a substitute for a laboratory hand book and detailed laboratory SOPs.

The following preconditions for prevention of HAIs should be addressed by HCF leaders and managers, informed by the evidence based information provided:

- **Infrastructure/system change:** Primary barriers range from simple measures, e.g., the availability and use of gloves, availability and use of other appropriate PPE and sealed centrifuge buckets, to more complex equipment, e.g. Biosafety cabinets. Good laboratory design and access to proper equipment is key. Access to occupational health support is also an important component in ensuring protection of laboratory personnel. Hazardous materials which may be harmful if handled improperly include equipment (e.g. needles, glass), chemical agents (e.g. acids, alkalis), and biological agents (e.g. clinical samples, microbial cultures).
- **Training and education:** a program of routine training and education and periodic retraining for all workers involved in laboratory work.
- **Monitoring, evaluation and feedback:** a program of regular monitoring and feedback is in place.
- **Awareness raising/promotion:** the practices described in the chapter are reinforced through awareness raising (e.g., use of posters displayed at the point of care).
- **Safety culture:** managers and leaders at every level of the HCF show their visible support for injection and phlebotomy safety and sharps injury prevention and reinforce a culture of patient safety.

### 5.2.1. Routes of Infection in the Clinical Laboratory

In order to appreciate and implement infection prevention and control recommendations in the work place, laboratory staff need to be aware of routes of transmission within the laboratory:

- **Inhalation:** Laboratory staff are at risk of infection from pathogens spread by aerosols generated by mechanical procedures such as mixing, grinding, blending/sonicating, centrifuging and pipetting.
- **Ingestion:** Infection via ingestion may occur when laboratory staff inadvertently place contaminated articles in the mouth, e.g. pens or pencils or fingers, consume food within the laboratory, and fail to adhere to good hand hygiene prior to eating or smoking, or mouth-pipette.
- **Inoculation:** Needles and sharps used in the laboratory pose both an injury risk (via direct inoculation of needle and laceration using sharps) and an infection risk (via inoculation). Scalpel blades used in histopathology/tissue pathology and microbiology laboratories and broken glassware may also transmit infections.

- **Skin and mucous membrane:** Splashing of skin from mechanical procedures and hand-to-face contact (e.g. rubbing eyes, biting nails) may result in transmission of pathogens via the mucous membranes of eyes, mouth, and nasal cavity.

### 5.2.2. General laboratory safety

All material of human origin (e.g. blood and body fluids, secretion/excretions and tissues) should be treated as potentially infectious. Laboratory workers should adhere to the following general safety practices:

- Access to the lab ***must be limited*** or restricted at all times. Use international biohazard sign for Laboratory door to restrict unauthorised visitors to the lab
- Children ***must not*** be authorized or allowed to enter laboratory working areas
- Do not store food or drinks in refrigerators that are used for reagents and clinical or research specimens. It is prohibited to wear protective laboratory clothing outside the laboratory, e.g.in canteens, coffee rooms, offices, libraries, staff rooms and toilets. Laboratory coats should be left in the lab when going on breaks, to lunch, or when leaving at the end of a shift and laundered per facility guidelines
- Eating, drinking, smoking, applying cosmetics and handling contact lenses is prohibited in the laboratory working areas
- Labels must not be licked
- Protective clothing such as laboratory coats should be worn at all times in the laboratory
- Open-toed footwear must not be worn in laboratories
- Wear appropriate gloves when handling and processing specimens, change gloves between tasks and do not touch “clean” surfaces (telephones, door handles, office desks, stationery, computer keyboards, etc.) with gloved hands. Once the task is finished, remove gloves carefully and discard in a designated laboratory waste and wash hands after removal of gloves. Use proper mechanical devices, such as suction bulbs or pipette for manipulating all liquids in the laboratory. ***No mouth pipetting is permitted***
- Centrifuge ***all*** materials in sealed tubes inside a sealed centrifuge and do not open a centrifuge while it is in motion
- Always cover the end of blood-collection tubes with a cloth or paper towel, or point them away from anyone’s face when opening
- Clean and decontaminate work surfaces (0.05% ppm available chlorine) daily or when they become contaminated, such as after spills (0.5% chlorine)
- Wear facial and eye protection (face mask and goggles or face shield) if splashes and sprays of blood, body fluids, or fluids containing infectious agents are possible
- Wear heavy-duty or utility gloves when cleaning laboratory glassware
- Minimize use of sharps as much as possible. If used then handle sharps with care and dispose of them immediately after use in puncture-resistant, leak proof sharps containers located close to work areas
- Do not re-sheath needles after use, this is the most common cause of needle stick injury
- Place infectious waste materials in designated plastic bags or containers as per local guidelines
- Do not perform any procedures that generate aerosols in the open laboratory. Use appropriate biosafety cabinet for containment
- Adhere to appropriate laboratory SOPs
- Immediately report any injury or accident (e.g. sharps) to supervisor ***(after first aid)*** for medical attention
- Vaccinate all laboratory staff members against HBV and other vaccine preventable disease as per local policy

### 5.2.3 Hand hygiene

Hand hygiene is the most important procedure for preventing and controlling the spread of contamination. Laboratory workers must perform hand hygiene throughout their shift, including:

- Before going on duty
- Immediately after coming in contact with contaminated objects or surfaces
- After contact with patient specimens containing blood and body fluids, secretion/excretions and tissues
- After removing gloves
- Before eating and before and after using the restroom

- Before going off duty

### 5.2.4 Biosafety Practices

- Use appropriate prohibition sign in the lab on the wall as reminder to enforce to safe practice
- Doors to laboratory must be kept closed when infectious materials are in use to alert non lab personnel not to enter the laboratory
- Treat all specimens from all patients as potentially infectious
- All laboratories must make hand-washing facilities available (***at the entrance/s and***) in each procedure room
- Collect all specimens for laboratory examination carefully using standard precautions
- Transport ***all specimens*** to the laboratory in a well-constructed robust leak proof container with a secure lid to prevent breakage, leakage and/or spillage during transport
- A requisition form issued by the department that is requesting testing must accompany all specimens submitted to the laboratory
- Tightly seal the caps of all containers and place them in a plastic bag and the requisition forms must be kept separately. Don't wrap requisition forms around the specimen container. This separation will prevent the forms from getting contaminated. Do not staple request form to the plastic bag
- Clinical team or departments ***must*** complete requisition forms properly and provide all of the data required by the headings on the forms
- Supply all additional information relevant to the nature of the specimen, time of collection, and treatment regimen of the patient that might affect the testing and reporting
- Transport specimens to the laboratory under conditions that preserve the specimen's integrity and that protect the HCW
- All specimens transported to the laboratory from field research, clinical hospitals or laboratory must be accompanied by a chain of custody form
- Wear gloves when handling and processing specimens
- Minimize splashing, spattering, and generating droplets while performing laboratory procedures
- Laboratory workers should follow mechanical pipetting procedures
- All laboratory staff ***must strictly*** adhere to local SOPs
- Decontaminate work areas after spills of blood, body fluids, or other potentially infectious material and after completing work as per lab SOPs
- Prior to servicing or repair, contaminated equipment must be decontaminated externally and internally as per manufacturer's instructions or if this is not available, they should be decontaminated as per lab SOP

### 5.2.5 Working with specimens

- Personnel who work with specimens in the lab must take these precautions:
- Put on gloves prior to handling the specimens
- Wear face and eye protection for procedures that are likely to generate splashes or sprays of blood or other potentially infectious material. Splashguards are an alternative to eye and face protection. These can be mounted on a cabinet and pulled down in front of the face for protection
- Use care when opening specimens. Open all specimen gently
- **Do not** use mouth pipette
- **Change reusable lab coats after splashes or on a daily basis, or use disposable coats/gown while working in the lab**
- Wash hands whenever they are soiled, following removal of gloves, prior to leaving the laboratory, and at the end of each day (see above)
- An eyewash station should be readily available in case of accidental splashes to the eye

### 5.2.6 Phlebotomy

- Blood drawing is a high-risk procedure given risk of accidental exposure to blood and sharps injury (e.g. needle stick)
- Laboratory workers collecting blood (e.g. phlebotomy or transfusion services) should follow good infection prevention and control practices (i.e. hand hygiene and glove use, and sharp safety devices if available) to minimize risk of accidental exposure
- Dispose of sharps/needles in designated robust sharps containers

To prevent complications and HAIs in patients:

- Avoid unnecessary transfusions
- Screen donors for serious blood-borne infections (HIV, HBV, HCV, syphilis, etc.)
- Collect the donor's blood aseptically into a closed system to minimize contamination
- Perform all steps in processing the blood within this closed system
- HCWs should wear gloves while collecting, testing, and transfusing blood
- HCWs should handle sharps carefully and dispose of them immediately in a puncture-resistant container
- HCWs should wear PPE at all times

### 5.2.7 Sputum specimens

- Laboratory procedures involving *Mycobacterium tuberculosis* pose a risk to laboratory workers from possible exposure to aerosols containing live *M. tuberculosis*
- Any laboratory personnel working with sputum specimens should protect themselves from possible exposure by performing work in Class I Bio Safety Cabinets (BSC) to prevent discharge of contaminated aerosols into the laboratory
- In the absence of a BSC, laboratory staff must employ appropriate respiratory protection and good laboratory technique to prepare sputum smears in a well-ventilated, separate area of the laboratory

### 5.2.8 Decontamination and sterilisation

- Cleaning and disinfection of work surfaces and spills and sterilization of laboratory equipment are critical to protecting laboratory workers from occupational exposure. At the end of each day, work surfaces in laboratories should be cleaned and decontaminated as per local standard operating procedures using 0.05%.
- Spills in the laboratory may occur on work surfaces (laboratory bench, BSC) or involve accidental spills or contamination on skin or clothing. Laboratories should have procedures in place to respond to spills

### 5.2.9 Disposal containers

- Waste disposal jars, should be washed with soap and water then decontaminated with 0.5% chlorine and rinsed in clean water before reuse
- Specimen containers and samples not being kept should be autoclaved before incineration

### 5.2.10 Packaging of specimens and etiologic agents

Shippers of infectious substances must comply with regulations and prepare shipments in such a manner that they arrive at their destination in good condition and present no hazards to persons or animals during shipment. The packaging must include both inner and outer packaging. For detail please consult WHO document 'Laboratory Biosafety Manual' (3rd edition). Geneva: World Health Organization: 2004).

### 5.2.11 Laboratory occupational health

Since laboratory workers are at risk of occupational injury and accidental exposure to microorganisms during laboratory procedures, an occupational health program should be in place to ensure laboratory workers receive appropriate vaccinations. Consult Occupational Health chapter for further information on protecting healthcare workers from occupational exposure.

### 5.2.12 Set up of laboratory

All laboratories should be located in the same area, preferable away from public areas, and divided into separate entities. Details guidelines are outlined in the WHO publication 'Laboratory Biosafety Manual'(3rd edition). Geneva: World Health Organization.

The following setup should be used for all laboratories:

- Samples should be collected in a special receiving area located next to the lab
- Dedicated toilets for the patients should be located next to the receiving area
- Samples should be transported to the lab by a trained HCW or porter. Samples should be placed in closed tubes for transportation
- A separate room should be affiliated with the lab for reprocessing glassware and instruments. An autoclave should always be available in this area
- Laboratories should be set up according to the following guidelines
- Design the laboratory so that it can be easily cleaned. Spaces between benches, cabinets, and equipment must be accessible for cleaning. Carpets and rugs in laboratories are inappropriate
- Provide lockable doors for facilities that house restricted microbiologic agents
- Provide separate sinks for hand washing and for disposing body fluids or chemicals
- Bench tops should be impervious to water and should be resistant to moderate heat and organic solvents, acids, alkalis, and chemicals that will be used to decontaminate the work surfaces and equipment
- Laboratory furniture should be capable of supporting anticipated loading and uses
- Cover chairs and other furniture used in laboratory work with a non-fabric material that can be easily decontaminated

## 5.3 Antenatal and labour suite

Pregnant women require appropriate clinical and obstetric care at all stages of their pregnancy whilst preventing potential exposure of others to infection. It is important to assess the risk of possible infection transmission at each stage of pregnancy and wear appropriate PPE for the activities being undertaken. Standard precautions as set out in the various chapters of these guidelines should always be adhered to with rigorous attention to hand hygiene, waste, sharps and laundry management, environmental cleaning and decontamination at all times. In addition, it is important that all pregnant women should be screened to determine contact risks for infections such as HIV and hepatitis B.

## 5.4 IPC in mortuary settings

Personal care of a body should honour the spiritual or cultural wishes of the deceased person. However, if the body has been in contact or has been diagnosed as an infection risk or has an unknown cause of death, including death on arrival at hospital certain standard precautions are required to safeguard the health care worker, mortuary attendant and funeral director.

It is essential that the management of dead bodies be handled with extreme sensitivity and a sensible approach. An individualized approach assists with the relationship between the families and carers at a time of probable distress.

It is unusual for organisms in a dead body to infect healthy people with intact skin, but there are other ways infection may be spread:

- Needle stick injuries from a contaminated instrument or sharp fragment of bone
- Intestinal pathogens from anal and oral orifices
- Leaking body fluids
- Through abrasions, wounds and sores on the skin
- Contaminated aerosols from body openings or wounds e.g. tubercule bacilli
- When condensation could possibly be forced out of the mouth
- Splashes and/or aerosols onto the eyes

The risks of infection are usually prevented by the use of standard precautions. Occasionally TBP are required as in the handling of a known or possible case of an infectious pathogen, such as for COVID-19.

While the risk of transmission of COVID-19 from handling the body of a deceased person is low, it is recommended the HCWs handling deceased patients don contact and droplet PPE. After use, PPE should be carefully removed and decontaminated or disposed as infectious waste as soon as practicable and hand hygiene should be performed. The body of a deceased person confirmed or suspected to have COVID-19 should be wrapped in cloth or fabric and transferred as soon as possible to the mortuary area. Body bags are not necessary for COVID-19 virus although they may be used for other reasons (e.g. excessive body fluid leakage). The responsible authority within the treatment centre should organise and prepare a team for dead body management. This team should have received appropriate training. They should have the necessary materials and PPE to prepare the body for burial.

IPC Standard Precautions should be adhered to at all times in the mortuary and include:

- Hand hygiene
- Appropriate use of protective clothing i.e. water repellent aprons and gloves when handling a body or decontaminating the environment (either disposable or heavy duty reusable)
- Use of body bags when indicated (see below)
- Appropriate cleaning of the environment
- Appropriate decontamination of equipment
- Body fluid spillage management
- Waste disposal as per waste management guidelines
- Safe use and disposal of sharps

There may be occasions when a body bag is required because the body is leaking body fluids or exudates, because the cause of death is unexplained or the individual was dead on arrival at hospital not met in the criteria above.

If a body is likely to leak or cause of death is unknown, then it must be placed in a body bag regardless of their infectivity status.

If the person had a known infectious disease or an unexplained cause of death you must inform anyone else coming into contact with that body e.g. Funeral Directors.

# Chapter 6: OCCUPATIONAL HEALTH AND SAFETY

## 6.1. Introduction

HCWs are at risk of exposure to blood and body substances, and to infectious diseases. Implementation of preventative measures against infectious diseases, and managing occupational exposure to blood and body substances, will assist in the maintenance of staff health.

The following preconditions support the minimization of risk of bodily injury and/or infection in HCWs, and should be addressed by HCF leaders and managers, to ensure that all HCWs adhere to the evidence based guidelines in this chapter.

**Infrastructure/system change**: access to the right equipment and supplies including PPE, and an environment that is designed and planned to facilitate patient and health worker safety. This includes Immunization programs.

**Training and education**: a program of routine health and safety education and training and periodic retraining for all personnel.

**Monitoring, evaluation and feedback**: Pre-placement health evaluation of HCWs and the establishment of protocols for surveillance and management of job-related illnesses and exposures to infectious diseases.

**Awareness raising/promotion**: the practices, including the Waste Management Plan described in the chapter are reinforced through awareness raising e.g. use of posters displayed across the HCF.

**Safety culture**: managers and leaders at every level of the HCF show their visible support for occupational health and safety to help develop and reinforce a culture of patient safety. This includes counselling services for personnel regarding infection risks related to employment or special conditions and the development, review and revision of policies and procedures and their ready availability in the HCF. Maintenance of confidential employee health and injury records is important.

### 6.1.1 Employer duties and responsibilities:

- Ensure a healthy and safe working environment for all employees
- Provide employees appropriate orientation, training and supervision on safety procedures
- Have safety and employee health standard operating procedures readily available to staff
- Assess and manage any identified risks (e.g., investigate accidents and illnesses)
- Document and report worker injury or illness
- Ensure best practices for HCW safety and IPC
- Have a process for worker feedback on safety issues

The following recommendations are intended to improve compliance with procedures and eliminate the risk of occupational injuries or HAI:

- Establish appropriate engineering controls (controls used to remove/reduce a hazard or place a barrier between the worker and the hazard in health care facilities)
- Make available and use appropriate supplies and equipment
- Readily accessible hand-washing facilities and materials
- Puncture-resistant, leak-proof, labelled or colour-coded sharps containers that are located as close as possible to their places of use
- Leak-proof containers for specimens and other regulated wastes that are properly labelled or colour-coded
- An easily accessible first-aid kit in all departments
- Implement controls for work practices:
    - Prohibit eating, drinking, smoking, applying cosmetics, and handling contact lenses in the work areas and on work sur-faces that carry an inherent potential for contamination

- Do not store food and drink in refrigerators, freezers, or cabinets where blood or other potentially infectious material is stored. Such storage equipment should be clearly labelled to prevent this possibility
- Wash hands and other skin surfaces that become contaminated with blood or other potentially infectious materials immediately and thoroughly with soap and running water
- Thoroughly wash (flush) with water mucous membranes that become contaminated
- Prohibit HCWs with open wounds or weeping skin rashes from all direct patient-care, potentially hazardous laboratory procedures, and handling patient-care equipment until recovery
- Cuts or abrasions should be protected with a waterproof dressing and gloves prior to performing any procedure that involves contact with blood and other potentially infectious material

- Adequately staff healthcare facilities
- Provide information and training
- Record and monitor exposures to blood and body fluids
- Monitor and maintain surveillance of work practices

### 6.1.2 Healthcare workers should practice the following:

- Follow safe work practices at all times
- Be familiar with employer's written departmental policies
- Know the potential health and safety hazards of the job and protective measures by participating in appropriate occupational health and safety training programs
- Use personal protective equipment (PPE) as trained and report any changes in personal medical condition that would require a change in status as to wearing PPE
- Know how to report unsafe working conditions
- Report any work-related injury or illness to supervisor
- Participate in accident and injury investigations
- Know what to do in an emergency
- Participate in health and safety committees (when available)

### 6.1.3 Pre-employment health evaluations

When personnel are initially appointed or are reassigned to different jobs or areas, a pre-placement evaluation can be used to ensure that persons are not placed in jobs that would pose undue risk of infection to them, other personnel, patients, or visitors. A health inventory is an important part of this evaluation. This inventory, can include determining a health worker's immunization status, and obtaining a history of any conditions that may predispose the health worker to acquiring or transmitting infectious diseases.

### 6.1.4 Personnel health and safety education

- Personnel are more likely to comply with an infection control program if they understand the rationale; thus staff education should be a central focus of the Infection Prevention and Control program
- Clearly written policies, guidelines, and procedures are needed for uniformity, efficiency, and effective coordination of activities
- All healthcare facilities should develop and implement appropriate orientation and in-service training programs for new employees, as well as, in-service refresher training (e.g., yearly) for existing employees
- Training should be designed to cover all cadres of staff, including doctors, nurses, clinical officers, laboratory workers, nonmedical workers, and support staff and should be matched to the roles/responsibilities of each group

- Health and safety training should ensure that workers know and understand the potential risks that are associated with waste from health care facilities, the value of immunization against vaccine preventable diseases such as, HBV and the importance of appropriate use of PPE

### 6.1.5. Immunisation

Since hospital personnel are at risk of exposure to and possible transmission of vaccine-preventable diseases because of their contact with patients or material from patients with infections, maintenance of immunity is an essential part of a hospital's occupational health and IPC program. Optimal use of immunizing agents will serve to safeguard the health of personnel and also protect patients from becoming infected by personnel. Following a consistent program of immunizations could eliminate the problem of susceptible personnel and avoid unnecessary activity restrictions. Immunizations should be free of charge and at least include the following:

- Hepatitis B vaccine (for HCWs whose occupational tasks place them at risk of exposure to blood or other potentially infectious material)
- MMR (measles, mumps, rubella)
- Influenza
- Chickenpox (varicella)
- Tdap (tetanus, diphtheria, pertussis)
- Meningococcal meningitis

The infection prevention issues for HCWs described in this section include:

- human immunodeficiency virus (HIV)
- hepatitis B virus (HBV)
- hepatitis C virus (HCV)
- tuberculosis (TB)
- meningococcal meningitis
- tetanus
- work restrictions
- guidelines for managing occupational exposure to blood and body substances
- immunisation of HCWs

## 6.2 HIV

HIV is transmitted from person to person via sexual contact, sharing of needles contaminated with HIV, infusions contaminated with HIV, and transplantation of organs or tissues infected with HIV. The risk of a HCW acquiring HIV after a needle stick or other sharp injury route is 0.3% and 0.9% via the mucous membrane and non-intact skin.

There are no confirmed effective methods of treatment and no cures for HIV, hence the focus must be on preventing exposure to HIV through safe infection control work practices, such as standard precautions, ongoing education and training, safe management, proper disposal of healthcare-related waste and sharps, and use of personal protective equipment. There is no vaccine for HIV.

## 6.3. Hepatitis B virus

The transmission route of hepatitis B is through blood and other body substances such as blood products, saliva, cerebrospinal fluid, peritoneal, pleural, pericardial and synovial fluid, amniotic fluid, semen and vaginal secretions. However, studies state that although HBV is present in saliva and tears, these body fluids have not represented an occupational risk to HBV unless it contains blood. Blood from persons infected with HBV contains the highest HBV titres of all body fluids.

HBV is one of several viruses that may be transmitted by significant exposure to blood or other body substances. HBV, like HIV, cannot be cured and often results in severe liver damage or death. There is a highly effective vaccine for HBV.

### 6.3.1 Hepatitis B immunisation

Immunisation is the best way of preventing HBV transmission to healthcare staff, and should be offered to all HCWs.
Hepatitis B immunisation is a series of three injections: an initial injection, an injection given one month after the initial injection, and one given six months after the initial injection.

### 6.3.2. Antibody testing

Post-immunisation testing for seroconversion should be done one to two months after the third immunisation dose. All HCWs should be responsible for knowing their immune status.

## 6.4. Hepatitis C virus

In the healthcare setting, the transmission route of HCV is largely parenteral (through the skin, for example a needle stick), through exposure to blood and body substances. Sexual transmission does occur, but is far less frequent. As with HIV, there are no confirmed effective methods for treating HCV, hence the focus must be on preventing exposure to HCV through safe infection control work practices (e.g. standard precautions, ongoing education and training, safe management and disposal of healthcare-related waste and sharps, and use of personal protective equipment). There is no vaccine for HCV.

## 6.5. Tuberculosis

Tuberculosis (TB) is usually transmitted by exposure to airborne particles produced by individuals with pulmonary disease while coughing and/or sneezing. Prolonged close contact with such individuals increases the risk of transmission. The aerosol droplets are very small, less than 5 µm in diameter, and can stay infectious for long periods in the air, making transmission possible when they are inhaled and settle into the lungs.

All health-care settings need a TB infection prevention and control program designed to ensure prompt detection, initiation of airborne precautions and treatment of persons who have suspected or confirmed MTB disease (or prompt referral of persons who have suspected MTB disease for settings in which persons with MTB disease are not expected to be encountered). Healthcare workers, including nurses, doctors, clinical officers, nursing and medical students, housekeeping staff, and others are vulnerable to tuberculosis (TB) exposure, infection, and disease. Healthcare workers are at even greater risk in the following circumstances:

- Aerosol-generating or aerosol-producing procedures, including bronchoscopy, endotracheal intubation, suctioning, other respiratory procedures, open abscess irrigation, autopsy, sputum induction, and aerosol treatments that induce coughing
- When they are working with difficult-to-treat TB such as relapses, treatment failure, multi-drug resistant (MDR), and extensively drug-resistant (XDR) TB
- Prolonged contact with patients with unrecognized TB disease who are not promptly handled with appropriate airborne precautions or patients moved from an airborne infection isolation (AII) room too soon (e.g., patients with unrecognized TB, patients with MDR or XDR TB)
- Longer duration of employment
- Working without following IPC procedures
- Having HIV infection

General IPC recommendations include the following.

- Assigning responsibility for TB IPC in the setting
- Conduct initial and ongoing evaluations of the risk for transmission of TB regardless of whether or not patients with suspected or confirmed TB disease are expected to be encountered in the setting:
    - The TB risk assessment determines the types of administrative, environmental, and respiratory-protection controls needed for a setting and serves as an ongoing evaluation tool of the quality of TB infection control and for the identification of needed improvements in infection-control measures
    - The risk assessment will help determine the facility's risk classification (low, medium, potential transmission of TB)

- Risk classification should be used as part of the risk assessment to determine the need for a TB screening program for HCWs and the frequency of screening

- Bacille Calmette–Guerin (BCG) is given as a childhood vaccination schedule in most nations to prevent severe forms of TB in children; it likely has little protective effect in adults
- Ongoing education should be provided to all healthcare personnel regarding the recognition, transmission and prevention of TB
- HCWs working in TB wards, intensive care units, medical nursing staff, mortuary staff, radiographers, physiotherapists, maids and laboratory staff working with TB specimens should be offered baseline Mantoux (PPD / TST / TB skin test) testing and chest x-rays

Recommendations for TB screening procedures for settings/HCWs classified as medium risk:

- All HCWs should receive baseline TB screening upon hire, using two-step tuberculin skin test (TST) or a single BioMedical Admissions Test (BAMT) to test for infection with TB
- After baseline testing for infection with TB, HCWs should receive TB screening annually (e.g., symptom screen for all HCWs and testing for infection with TB (for HCWs with baseline negative test results)
- HCWs with a baseline positive or newly positive test result for TB infection or documentation of previous treatment for latent TB infection (LTBI) or TB disease should receive one chest radiograph result to exclude TB disease

HCWs with TB disease should be allowed to return to work when they:

- Have had three negative AFB sputum smear results collected 8–24 hours apart, with at least one being an early morning specimen because respiratory secretions pool overnight
- Have responded to anti-tuberculosis treatment that will probably be effective based on susceptibility results
- In addition, HCWs with TB disease should be allowed to return to work when a physician knowledgeable and experienced in managing TB disease determines that HCWs are non-infectious
- Consideration should also be given to the type of setting and the potential risk to patients (e.g., general medical office versus HIV clinic)
- HCWs with active TB should be provided with sick leave (with pay) during the period of the illness

## 6.6. Meningococcal meningitis

*Neisseria meningitidis* is transmitted via direct contact, particularly by respiratory droplets from the nose or throat of colonised or infected people. Individuals with meningococcal septicaemia (blood poisoning) or meningitis are usually not infectious after 24 hours of appropriate antibiotic therapy.

The risk of transmission is high for HCWs who have been in direct prolonged contact with the patient and have not been wearing personal protective equipment (i.e. masks), or have been involved in mouth-to-mouth resuscitation, intubation or bronchoscopy of infected patients.

Antibiotic prophylaxis (treatment to prevent developing symptoms) should be made available to HCWs in these situations if the risk of exposure has been deemed to be significant. No prophylaxis can be considered 100% effective; prevention of exposure should therefore be aimed for. Immunisation is available for some strains.

## 6.7. Tetanus

Tetanus enters the body through wounds contaminated with soil, human and animal faeces, and street dust. Tetanus vaccinations are given as a childhood vaccination schedule in most nations. A booster vaccination is required every 10 years. Tetanus status should be reviewed in the event of an occupational exposure to blood or body substances, particularly those involving used or discarded sharps or needles, or for deep or dirty wounds. People who haven't had a recent booster should be re-vaccinated.

## 6.8. COVID 19

COVID-19 is primarily transmitted between people through direct contact and droplet transmission, noting there is a risk of airborne transmission during aerosolising procedures. In addition to standard precautions

which are to be used when caring for all patients, WHO recommends droplet and contact precautions be implemented when caring for all suspected COVID-19 patients. Airborne precautions are to be implemented only when conducting aerosol generating procedures and providing supportive airway management procedures, according to risk assessment. As COVID-19 is known to survive on some environmental surfaces for up to 3 days, effective cleaning and disinfection processes must also be implemented as outlined in Chapter 4.

## 6.9. Work restrictions

**Table 1: Work restrictions for healthcare workers exposed to, or infected with, selected infectious diseases**

| Disease/pathogen | Relieve from direct patient contact | Partial work Restriction | Duration |
|---|---|---|---|
| **Conjunctivitis** Infectious | Yes | | Until discharge ceases |
| **COVID 19** Infectious | Yes | | Exclude personnel with COVID 19 from the workplace until the facility has documentation from their healthcare provider that they are no longer contagious |
| **Cytomegalovirus** Infectious | No | | |
| **Diphtheria** | Yes | | Exclude exposed staff and those identified as asymptomatic carriers from duty until antimicrobial therapy is completed and results of two nasopharyngeal cultures obtained at least 24 hours apart are negative. |
| **Enteroviral infections** | Yes | Restrict from care of infants, neonates, and immunocompromised patients and their environments | Until symptoms resolve. |
| **Gastroenteritis** Acute | Yes | | Until symptoms resolve and infection with Salmonella is ruled out. |
| **Group a streptococcus infections** | Assess | | Do not routinely exclude personnel unless it is shown epidemiologically that they are responsible for disseminating the organism in the healthcare setting. |
| **Hepatitis A** | Yes | | Until 7 days after onset of jaundice |
| **Hepatitis B** acute symptoms | Assess | | Refer to specialist |
| **Hepatitis C** | Assess | May be restricted from performing exposure prone procedures. | Refer to specialist |

| | | | |
|---|---|---|---|
| **Herpes simplex**<br>orofacial or genital | Assess | | Assess the potential for transmission to high-risk<br>patients (neonatal intensive care unit patients,<br>patients with severe burns or eczema, and severely immunocompromised patients) and the<br>need for exclusion from the care of such patients. Counsel to cover and not touch the<br>infected lesions, hand hygiene, do not allow the<br>lesions to touch patients with dermatitis. |
| herpetic whitlow (fingers and hands) | Yes | | Exclude until lesions are healed |
| **Herpes zoster**<br>**Shingles** | Yes | Restrict immunocompetent personnel with localised zoster from the care of high-risk patients until lesions are crusted; allow them to care for other patients with lesions covered. | Restrict immunocompromised personnel with zoster from contact with patients until lesions are crusted.<br><br>Restrict susceptible personnel exposed to zoster from patient contact from the 10th day after the first exposure through the 21st day after the last exposure. |
| **HIV** | Assess | May be restricted from performing exposure prone procedures. | Refer to specialist |
| **Influenza and other viral respiratory illness including the common cold** | Yes | | Consider excluding personnel with acute febrile respiratory infections from the care of high risk patients (e.g. neonates, young infants, patients with chronic obstructive lung disease and immunocompromised patients) during community outbreaks of influenza or respiratory syncitial virus (RSV) infections. |
| **Measles**<br>Active | Yes | | Until 7 days after the rash appears or for the duration of their acute illness, whichever is longer. |
| post exposure<br>(susceptible personnel) | Yes | | From the 5th through the 21st day after the last exposure OR 7 days after the rash appears or for the duration of their acute illness, whichever is longer. |
| **Meningococcal disease** | Yes | | Exclude personnel with *N. meningitidis* infections from duty until 24 hours after the start of effective antibiotic therapy. Do not routinely exclude personnel from duty who only have nasopharyngeal carriage of *N. meningitidis*. |
| **Mumps** | Yes | | Exclude susceptible personnel who are exposed to mumps from duty from the 12th day after the first exposure through the 26th day after the last exposure or, if symptoms develop, until 9 days after the onset of parotitis. |

| | | | |
|---|---|---|---|
| **Pertussis** | Yes | | Exclude personnel in whom symptoms develop (cough ≥7 days, particularly if accompanied by paroxysms of coughing, inspiratory whoop, or post-tussive vomiting) after known exposure to pertussis from patient care areas until 5 days after the start of appropriate therapy |
| **Rubella** | Yes | | Exclude susceptible personnel who ar exposed to rubella from duty from the 7th day after the first exposure through the 21st day after the last exposure. Exclude personnel who acquire rubella from duty until 7 days after the beginning of the rash. |
| **Scabies and pediculosis** | Yes | | Exclude personnel with confirmed scabies from the care of patients until they have received appropriate treatment and have been shown, by medical evaluation, to have been effectively treated. Exclude personnel with confirmed of suspected louse infestation from contact with patients until after they receive appropriate initial treatment and are found to be free of adult and immature lice. |
| **Staphylococcal infection or carriage** | Assess | | Do not routinely exclude personnel unless it is shown epidemiologically that they are responsible for disseminating the organism in the healthcare setting. |
| **Tuberculosis**<br>Lung or larynx | Yes | | Exclude personnel with infectious pulmonary or laryngeal TB from the workplace until the facility has documentation from their healthcare provider that they are receiving adequate therapy, their coughs have resolved, and that they have had three consecutive sputum smears collected on different days with negative results for acid fast bacilli (AFB). After personnel return to work, obtain periodic documentation from their healthcare provider that effective drug therapy has been maintained for the recommended period and that sputum smear results AFB negative. |
| other sites | Assess | | Do not exclude personnel from the workplace who have TB only at sites other than the lung or larynx. |
| **Varicella** | Yes | | Exclude personnel from work who have onset of varicella until all lesions have dried and crusted. Exclude from duty after exposure to varicella personnel who are not known to be immune to varicella (by history or serology), beginning on the 10th |

| | | | |
|---|---|---|---|
| | | | day after the first exposure until the 21st day after the last exposure. |

## 6.9 Guidelines for managing occupational exposures to blood and body substances

Occupational exposure is defined as an incident that occurs during the course of a person's employment and involves contact with blood or body substances. Such exposure may put the person at risk of acquiring a blood borne infection.

Adherence to standard infection control practices remains the first line of protection for HCWs against occupational exposure to HIV, HBV and HCV.

Policies should be developed at national and local level to cover all people in a healthcare setting, including all staff and visitors such as clinical staff, non-clinical staff (e.g. administrators, house-keeping and laundry staff, maintenance workers), laboratory staff, volunteers, private contractors and consultants.

### 6.9.1 Prevention of occupational exposure

Preventing exposure through safer practices, barrier precautions, safer needle devices and other methods remains the most effective strategy for reducing the risk of infection with HIV and other blood borne pathogens in healthcare settings.

Two significant prevention priorities are that all:

- HCWs should be trained in, and be able to demonstrate competency in, standard precautions, and
- staff should be provided with the necessary materials and protective equipment

Staff should also be knowledgeable about the risks of acquiring HIV and other blood borne pathogens sexually, and should have ready access to condoms and confidential sexually transmitted infection treatment services.

The following measures aimed at reducing the incidence of occupational exposures should be taken.

- Never recap needles
- Do not disconnect needles from the syringe
- Always transport (or pass to another person) sharp objects in a kidney dish or puncture-proof container
- Sharps should be disposed of in puncture-proof containers
- Take care with all blood contaminated equipment

All employers must ensure that the following management strategies are implemented:

- An efficient system for reporting and managing potential exposures of HCWs to blood and body substances
- Confidentiality of injured HCWs is maintained
- Expert advice is available to all HCWs 24 hours a day, and that processes are in place to facilitate ready access to appropriate treatment
- Rapid assessment of HCWs is available to ensure timely administration of specific prophylaxis, if appropriate
- All occupational exposures are fully documented to meet regulatory requirements

### 6.9.2 Definition and reporting of occupational exposure

Occupational exposure includes:

- percutaneous injuries or cuts with used instruments, such as needles or scalpel blades, and involving blood or other body substances
- contamination of fresh cuts or abrasions with blood or other body substances
- contamination of the eyes or other mucous surfaces with blood or other body substances

### 6.9.3 Immediate care of the exposed person

It is strongly recommended that immediately after an occupational exposure to blood or other body substances, the following measures must be followed (Appendix 12 Occupational Exposure Management):

- perform first aid
- wash affected site of exposure and any remaining blood on the skin under running water with soap
- apply a sterile dressing if necessary and apply pressure through the dressing if still bleeding
- do not squeeze or rub the injury site
- do not use strong solutions such as iodine or bleach on the wound
- if eyes have been exposed or contaminated, irrigate gently with normal saline or water while it is open for at least 30 seconds (remove contact lens after irrigation, then irrigate again)
- if blood or body substances gets in the mouth, spit it out immediately and rinse the mouth with water several times
- if clothing is contaminated, remove and shower.
- if water is not available for washing percutaneous exposures or punctures of the skin, ABHR or antiseptic should replace soap and water

### 6.9.4. Procedure for reporting occupational exposures

- The HCW should IMMEDIATELY report the exposure to their supervisor or manager (24 hours per day)
- The supervisor should arrange immediate medical assessment (24 hours per day) of the HCW and the patient who is the “source” of the exposure
- Complete an exposure report. An exposure report should contain the following information:
  - The name of the staff member involved
  - Area where the incident occurred such as the ward, operating room or emergency room
  - A description of the incident
  - The name of the source person whose blood or body substances were involved in the incident
  - If the source of the blood is unknown this must also be documented

As soon as possible (within one day), a copy of the incident form should be sent to the IPC officer (or equivalent) and the exposed HCW’s supervisor, so that they can be aware of any standard precaution procedural risks or lapses, in a confidential, sensitive and non-judgmental way.

### 6.9.5 Medical assessment

A medical risk assessment involves taking and recording the history and details of the occupational exposure and assessing the risk for HIV, HBV and HCV from the source person and the exposed person. This assessment should be undertaken by a trained person IMMEDIATELY after first aid is given, regardless of what time of day the occupational exposure occurs. Immediately after the reporting the incident, arrangements should be made to release the HCW from work so that immediate risk assessment can be made. Information to be examined during the assessment includes:

- date, time and location of the exposure
- duty being performed at time of exposure
- how exposure occurred
- protective clothing such as gloves being worn at time of incident
- nature of exposure such as percutaneous, mucous membrane non-intact skin
- type and volume of blood and/or body substances exposed to
- duration of contact with blood and/or body substances
- if a sharps injury: type of implement involved, whether it was visibly contaminated with blood, depth of injury, if bleeding occurred
- if a needle stick injury: needle gauge, syringe size, purpose for which needle had been used
- if non-intact skin: condition of skin
- HIV, HBV and HCV status of the source (if known)

- HBV immunity and vaccination history of the exposed person

### 6.9.6 Exposure and source patient

Exposure should be assessed for its potential to transmit a blood borne pathogen (based on the clinical assessment of the exposure and the eligibility for post-exposure prophylaxis).

If testing a source patient of unknown status is possible, it should only occur after obtaining informed consent, and should include appropriate pre-test counselling and a referral plan for care, treatment and support. Confidentiality must be maintained throughout the process.

Medical assessment constitutes an emergency for the exposed HCW. Baseline testing for HIV and follow-up testing should for part of the clinical pathway but **should not delay initiating post-exposure prophylaxis where warranted.**

Baseline testing is done at this time to ascertain whether the exposed person has been infected from a previous exposure at the time of the incident. The following should be done:

- Baseline testing should occur immediately (after first aid has been completed) following exposure, but at least within 72 hours
- Baseline tests are usually HIV antibody, hepatitis B surface antigen (HbsAg) and hepatitis B and C antibodies
- The HCW's tetanus immunisation status should be considered
- Pre-test counselling for HIV should occur before any blood is taken for testing (but blood drawing should not be delayed if an appropriate counsellor cannot be located right away)
- Follow-up retesting for HIV, HBV and HCV should occur at six weeks and three months. There is also a six-month follow up for HIV and HCV only

Clinical evaluation and baseline testing of the exposed HCW, which should proceed only after pre-test counselling and after obtaining informed consent, should always include a/an:

- explanation of privacy and confidentiality
- and, if necessary, further explanation of HIV, HBV and HCV infection and its consequences
- explanation of testing, possible results and confirmatory testing
- assessment of risk related to past and current sexual and other behaviour
- assessment of risk related to the occupational exposure in question
- explanation of low transmission risk associated with occupational exposure
- assessment of anxiety level and coping mechanisms
- informed consent for testing
- informed consent for pregnancy test (if indicated)
- plan for precautions while awaiting test results (and while on PEP, if indicated): adverse effects of anti-retrovirals (ARVs), safer sexual practices or abstinence, cessation of breast feeding if lactating'
- list of any other risks identified by sexual and behavioural history
- mechanism for support while patient waits for test results, and while on PEP if indicated
- review of the sequence of events that preceded the exposure, and provide exposure risk reduction education in a sensitive and non-judgmental way

### 6.9.7 Risk of HIV and other infections following occupational exposure

Data from several studies of HCWs exposed to HIV in the work place suggest that the risk of HIV transmission after percutaneous exposure to HIV-infected blood is approximately 0.3% (95% confidence interval [CI] 0.2 to 0.5%).

Risks towards the higher range are associated with exposures such as:

- a deep injury
- visible blood on the "sharp" device causing the injury
- a hollow-bore needle (as opposed to a solid one)

- injury by a needle that was previously used in the patient's vein or artery
- a high viral load on the part of the patient (either acute or late-stage HIV infection or, if being managed at a specialist centre overseas, a known high viral load)

The risk of transmission from a "sharp" object contaminated with other infected body fluids or tissues is believed to be lower than for exposure to infected blood.

After a mucous membrane (eye, nose or mouth) exposure to HIV-infected blood, the risk is approximately 0.09% (95% CI 0.006 to 0.5%).

According to the Centers for Disease Control and Prevention (CDC), studies indicate that HCW's who sustained injuries from needles contaminated with blood contaminated by HBV, the risk of developing **clinical hepatitis** if the blood was both **HBsAg-positive and HBeAg positive was 22%**
- **31%,** the risk of developing **serologic evidence of HBV infection was 37% - 62%.** By comparison, the risk for developing **clinical hepatitis** from needles contaminated with **HBsAg-positive and HBeAg- negative was 1% - 6%,** the risk for developing **serologic evidence for HBV infection was 23% - 37%.**

The risk for hepatitis C infection after percutaneous exposure to infected blood is approximately 1.8%. Infection with hepatitis C following mucous membrane exposure has not been quantified but is thought to be rare.

Post-exposure prophylaxis (PEP) is treatment to reduce the likelihood of HIV, HBV and tetanus infection in HCWs after possible occupational exposure. There is no PEP available for HCV.

### 6.9.8 Annual review of personal protection equipment guidelines

Due to the rapidly evolving nature of all aspects of HIV/AIDS and other blood borne pathogens (e.g. diagnosis, treatment and care), these guidelines should be reviewed annually by the HIV/AIDS clinical team in the healthcare facility.

### 6.9.9 HIV post exposure prophylaxis (PEP)

Health care workers should have immediate access to PEP, 24 hours a day, seven days a week to be freely dispensed by any hospital (private or public), regardless of the location or type of work they do. The minimum care following potential exposure to HIV should be risk assessment and, if deemed necessary, the first dose of PEP medication.

Assess the following to evaluate the eligibility for HIV PEP:
- The timing of the potential exposure
- The HIV status of the person exposed
- The nature and risk of the exposure (i.e. needle stick injury, mucous membrane exposure or intact skin exposure)
- The HIV status of the source of the potential exposure

PEP is not indicated under the following circumstances:
- If the source patient is infected with HIV-1 and exposed healthcare worker is positive for HIV-2
- If the exposure does not pose a risk of transmission:
  - Exposure of intact skin to potentially infectious body fluids
  - Exposure to non-infectious body fluids (such as faeces, saliva, urine, and sweat)
  - Exposure to body fluids from a person known to be HIV-negative, unless this person is identified as being at high risk for recent infection
  - If the exposure occurred more than 72 hours previously

A starter pack (or a first dose) of PEP drugs should be offered to individuals who are determined to be at risk as soon as possible, within one hour and not later than 72 hours, after exposure. Do not offer PEP to anyone more than 72 hours after exposure. An HIV test should normally not be a condition of initiating PEP, nor should PEP be delayed until the results of a HIV test become available.

Summary of Post Exposure Management of HIV Recommendations

- ❑ Post – Exposure Prophylaxis (PEP) is recommended when occupational exposures to HIV occur
- ❑ Determine the HIV status of the exposure source patient to guide need for HIV PEP, if possible
- ❑ Start PEP medication regimens as soon as possible after occupational exposure to HIV and continue them for a 4-week duration
- ❑ New Recommendation --- PEP medication regimens should contain 3 (or more) antiretroviral drugs for all occupational exposures to HIV
- ❑ Expert consultation is recommended for any occupational exposures to HIV and at a minimum for situations described in Box 1
- ❑ Provide close follow-up for exposed personnel that includes counselling, baseline and follow-up HIV testing, and monitoring for drug toxicity. Follow-up appointments should begin within 72 hours of an HIV exposure
- ❑ New Recommendation --- if a newer 4th generation combination HIV p24 antigen-HIV antibody test is utilized for follow-up HIV testing of exposed HCP, HIV testing may be concluded at 4 months after exposure (Box 2). If a newer testing platform is not available, follow-up HIV testing is typically concluded at 6months after an HIV exposure.

**Preferred HIV PEP Regimen**

Raltegravir (Isentress, ®RAL) 400 mg PO Twice

daily Plus

Truvada ™, 1 PO once daily

[Tenofovir DF (Viread ®; TDF) 300 mg + emtricitabine (Emtriva ™; FTC) 200mg]

**Alternative Regimes**

(May combine one drug or drug pair from the left column. Prescribers unfamiliar with these agents/regimes should consult physicians familiar with the agents and toxicities

| | |
|---|---|
| Raltegravir (Isentress®; RAL) | Tenofovir DF (Viread®; TDF) + emtricitabine (Emtriva™; FTC); available as Truvada™ |
| Darunavir (Prezista®; DRV) + ritonavir (Norvir®; RTV) | Tenofovir DF (Viread®; TDF) + lamivudine (Epivir®; 3TC) |
| Etravirine (Intelence®; ETR) | Zidovudine (Retrovir™; ZDV; AZT) + lamivudine (Epivir®; 3TC); available as Combivir® |

| | |
|---|---|
| Rilpivirine (Edurant™; RPV) | Zidovudine (Retrovir®; ZDV; AZT<br>emtricitabine (Emtriva™; FTC) |
| Atazanavir (Reyataz®; ATV) + ritonavir (Norvir®; RTV) | |
| Lopinavir/ritonavir (Kaletra®; LPV/RTV) | |
| The following alternative is a complete fixed-dose combination regimen and no additional antiretrovirals are needed: Stribild™ (elvitegravir, cobicistat, tenofovir DF, emtricitabine) | |

### 6.9.10 Hepatitis C PEP

There is no HCV prophylaxis to offer HCWs at this time. For hepatitis C, PEP agents (e.g. ribavirin, interferon) are expensive and potentially very toxic. Prevention remains the best way to avoid hepatitis C.

### 6.9.11 Hepatitis B PEP

Childhood vaccination against hepatitis B is included in the expanded programme on immunisation. Management of possible exposure to hepatitis B should follow existing national guidelines and protocols but ideally, all HCWs should already be immune to hepatitis B. Hepatitis B immunoglobulin (HBIG) is available, and vaccination should be given to exposed individuals who have not been previously vaccinated Table 2 summarises the recommended actions to protect HCWs against occupationally acquired hepatitis B.

**Table 1**

| ALTERNATIVE ANTIRETROVIRAL AGENTS FOR USE AS PEP ONLY WITH EXPERT CONSULTATION |
|---|
| Abacavir (Ziagen®; ABC) |
| Efavirenz (Sustiva®; EFV) |
| Enfuvirtide (Fuzeon™; T20) |
| Fosamprenavir (Lexiva®; FOSAPV) |
| Maraviroc (Selzentry®; MVC) |
| Saquinavir (Invirase®; SQV) |
| Stavudine (Zerit®; d4T) |
| |
| **ANTIRETROVIRAL AGENTS GENERALLY NOT RECOMMENDED FOR USE AS PEP** |
| Didanosine (Videx EC ® ddl) |
| Nelfinavir (Viracept ®NFV) |
| Tipranavir (Aptivus®; TPV) |
| |
| **ANTIRETROVIRAL AGENTS CONTRAINDICATED AS PEP** |
| Nevirapine (Viramune ®;NVD) |

**Table 2: Post-exposure prophylaxis against hepatitis B infection where serological testing and hepatitis B immunoglobulin are available**

| | **SOURCE PATIENT** | |
|---|---|---|
| **Healthcare worker** | **HBSAg+** | **Unknown** |
| **Unvaccinated** | | |
| | HBIG x 1 dose<br>*plus*<br>hepatitis B vaccine x 3 doses | hepatitis B vaccine x 3 doses |
| **Vaccinated** | | |
| **Serological "responder"** (anti-HBs >10 mIU/ml) | No treatment | No treatment |
| **Serological** | HBIG x 1 dose | If higher risk exposure: |

| | | |
|---|---|---|
| **"non-responder"**<br>(anti-HBs <10 mIU/ml) | *plus*<br>hepatitis B vaccine x 3 doses | HBIG x 1 dose<br>*plus*<br>hepatitis B vaccine x 3 doses |
| **Antibody status unknown** | **Test for anti-HBs if available**<br>If anti-HBs >10 mIU/ml:<br>No treatment<br>If anti-HBs <10 mIU/ml:<br>HBIG x 1 dose<br>*plus*<br>hepatitis B vaccine x 1 doses | **Test for anti-HBs if available**<br>If anti-HBs >10 mIU/ml:<br>No treatment<br>If anti-HBs <10 mIU/ml:<br>hepatitis B vaccine x 3 doses |

**Note:** Hepatitis B Immune Globulin (HBIG) should be administered soon after the exposure when indicated. It is administered intramuscularly either on the gluteal or deltoid muscle. The dosage for HBIG is 0.06ml/kg.

Hepatitis B vaccination is 20µg intramuscularly per dose and is administered at 0, 1 and 6 months.

### 6.9.12 Tetanus PEP

Tetanus prophylaxis should be recommended depending on the type of exposure and the exposed person's past history of tetanus immunisation.

- If less than five years since immunisation, then no tetanus immunoglobulin or tetanus toxoid is necessary.
- If 5–10 years since immunisation, a tetanus toxoid booster is recommended.

If more than 10 years since immunisation, both tetanus immunoglobulin and tetanus toxoid is recommended.

## 6.10 Immunisation of healthcare workers

| Vaccines | Recommendations |
|---|---|
| Hepatitis B vaccine | If you don't have documented evidence of a complete blood test that shows you are immune to hepatitis B (i.e., no serologic evidence of immunity or prior vaccination) then you should:<br>• Get the 3-dose series (dose #1 now, #2 in 1 month, #3 approximately 5 months after #2).<br>• Get anti-HBs serologic tested 1–2 months after dose #3 |
| Influenza | Get 1 dose of influenza vaccine annually |
| MMR (Measles/Mumps/Rubella) | *If you were born in 1957* or later and have not had the MMR vaccine, or if you don't have an up-to-date blood test that shows you are immune to measles or mumps (i.e., no serologic evidence of immunity or prior vaccination), get 2 doses of MMR (1 dose now and the 2nd dose at least 28 days later). *If you were born in 1957 or later* and have not had the MMR vaccine, or if you don't have an up-to-date blood test that shows you are immune to rubella, only 1 dose of MMR is recommended. However, you may end up receiving 2 doses, because the rubella component is in the combination vaccine with measles and mumps.<br>*For HCWs born before 1957*:<br>Acceptable evidence of measles, rubella, and mumps immunity, health-care facilities should consider vaccinating unvaccinated personnel born before 1957 who do not have laboratory evidence of measles, rubella, and mumps immunity; laboratory confirmation of disease; or vaccination with 2 appropriately spaced doses of MMR vaccine for measles and mumps and 1dose of MMR vaccine for rubella. Vaccination recommendations during outbreaks differ from routine recommendations for this group |
| Varicella | If you have not had chickenpox (varicella), if you haven't had varicella vaccine, or if you don't have an up-to-date blood test that shows you are immune to varicella (i.e., no serologic evidence of immunity or prior vaccination) get 2 doses of varicella vaccine, 4 weeks apart |

| | |
|---|---|
| Tdap (Tetanus/Diphtheria/Pertussis) | Get a one-time dose of Tdap as soon as possible if you have not received Tdap previously (regardless of when previous dose of Td was received).<br>Get Td boosters every 10 years thereafter.<br>Pregnant HCWs need to get a dose of Tdap during each pregnancy. |
| Meningococcal | Those who are routinely exposed to isolates of N. meningitidis should get one dose |

# Chapter 7 SURVEILLANCE FOR IPC

## 7.1 Introduction

Surveillance, in the public health context, is the "ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health".[5] One of the key elements of surveillance is that the process must be systematic. Furthermore, there is little gain to performing surveillance if the information and results obtained from it will not be used.

The specific goals of surveillance may vary somewhat depending on who is conducting it and the population under study, and may include any or all of the following: establishing baseline or endemic rates of disease; identification of disease outbreaks or changes in disease trends; determination of risk factors for or the natural history of specific diseases; measurement of compliance with established standards; and assessment of the effect(s) of practice changes, new interventions, or new technology.

Surveillance in an infection prevention and public health context also aids in the detection of communicable diseases of public health importance that should be reported to health authorities to prevent spread (e.g., tuberculosis, viral haemorrhagic fevers, sexually transmitted infections), provides the foundation for immediate preventive actions (e.g., in outbreaks of disease), and directs public health policy. Ultimately, surveillance should generate data that can be applied in some manner to improve care.

The WHO defines surveillance as a systematic collection, analysis and interpretation of health related data needed for the planning, implementation and evaluation of clinical practice. IPC surveillance can:

- Provide a baseline for HAIs on agents, host and environment from a range of sources
- Serve as an early warning system for outbreaks and identifies the break-down in IPC
- Document the impact of an intervention or track progress towards specific goals
- Make improvements to infection prevention and control program and strategies

Active surveillance is a core component of the IPC program and is normally performed by the IPC Nurse/Officer. However, it is not recommended to conduct facility wide surveillance for all areas of the IPC program. Therefore, surveillance should respond to actual needs of the healthcare facility and is often targeted to specific areas and populations and those infections that are preventable.

## 7.2 Objectives of surveillance

A good surveillance program will include a written plan that outlines the goals and objectives of the program, and should be based on a framework that includes several well-defined practices.[6] A written plan also allows for strategic allocation of resources to enable effective and meaningful surveillance, decrease HAI rates, and improve patient safety. Surveillance programs should be evaluated periodically to ensure that they are effectively meeting the needs of the facility.[7]

The specific objectives of a surveillance program include:

- To improve awareness of clinical staff and other HCWs (including administrators about HAI and AMR
- Identification of high-risk populations, procedures and exposures
- Monitoring of trends

- Identify possible areas of improvement inpatient care, and for further epidemiological studies
- Early detection of outbreaks
- Assessment of the impact of interventions

## 7.3 Surveillance inclusions

The following maybe considered for HAI surveillance:

- Specific sites of infection (e.g. bloodstream, surgical site infection, indwelling urinary catheters) etc.
- Specific population (e.g. HCWs occupational exposure to blood and body substances, neonates) etc.
- Specific organisms that can have severe outcomes (multidrug resistant organisms);
- Specific locations (intensive care unit, neonatal intensive care units) etc.

A surveillance program should include:

- Nationally standardized set of case definitions that are consistently and accurately applied
- Standardized methods for identification of the number of persons developing an infection (numerator)
- Standardized methods for detecting the exposed or at risk population (denominator)
- The time period involved
- Process for analysis of data and reports, calculation of rates and both numerator and denominator

HAI rates are developed by three elements:

- Numerator - number of persons developing an infection
- Denominator - the exposed or at risk population
- The time period involved

Other surveillance/audits activities can include:

- Hand hygiene audits for all clinical units
- Environmental audits on cleaning schedules, colour coding
- Waste management audits
- Audits on specific work practices such as:
    - Use of surgical antimicrobial prophylaxis
    - Aseptic manipulation of invasive devices etc.

## 7.4. National IPC surveillance

At the national level, IPC surveillance activities and responsibilities should include:

- Coordination, gathering and documentation of available data on HAI from all levels of health service delivery
- Defies the national objectives of surveillance
- Establishes the priorities for surveillance of infections, pathogens and others
- Establishes what data should be provided to the MHMS and how
- Reports to interested parties on the national situation of HAI and special events
- Standardises:
    - case definitions
    - methods of surveillance
- Promotes the assessment of IPC practices and other relevant processes in a blame-free organisational culture

## 7.5. Healthcare facility surveillance

At the health service delivery level, IPC surveillance activities and responsibilities should include:

- Documents the situation of HAI and IPC processes in the healthcare facility
- Defines the local objectives of surveillance aligned with the national objectives
- Establishes the priorities for surveillance according to the scope of care in the facility
- Establishes the minimum registers necessary for medical records used for surveillance purposes and monitors compliance
- Conducts surveillance applying national standardised case definitions and methods of surveillance of infections
- Detects outbreaks and coordinates the response
- Reports HAI and events to the local interested parties and the MHMS as required by regulations
- Conducts the assessment of IIPC practices and other relevant processes in an blame-free organisational culture

## 7.6 Minimum requirements

Performing accurate and reliable surveillance may be challenging even in the most well-resourced settings, where multiple data sources are accessible to the surveillance team, information technology services and computer infrastructure are well established, and dedicated trained personnel (i.e., infection control professionals) are present. In resource-limited settings that may be lacking in one or more of these dimensions, the following may be considered as minimum requirements for surveillance:

1. Assess the population. Even the most basic surveillance programs must consider the types of patients receiving care, and the types of services the facility provides, to determine the risks of infection.
2. Select processes or outcomes for surveillance. Identifying and measuring the most important outcomes, and limiting process measures to those that are most important in the patient population, can conserve time and other resources in limited settings.
3. Use surveillance definitions. For some surveillance activities, collecting limited data may be simpler and more time efficient, with less dependence on other resources.
4. Collect surveillance data. Because data collection can be labour and time intensive, and many resource-limited settings will not have access to computerized data, other individuals may need to be trained to assist with data collection. Severely resource-limited settings may consider conducting repeated point prevalence surveys that can identify high-risk areas requiring more attention, and to monitor HAI or process indicators in these areas. In lieu of ongoing continuous surveillance, sampling or more prolonged periodic surveillance of specific programs or procedures can also save time and resources; for example, SSI or ICU surveillance might be conducted for only three months each year instead of, recognizing that seasonal or other unexpected variation may be missed.
5. Analyse and interpret data. In smaller or more basic surveillance programs, data analysis can be simplified to provide only the most important results. Risk stratification may not be feasible for various reasons (e.g., missing data, or inadequate training or resources) and can be omitted, although this may limit comparisons with other organizations or published benchmarks.
6. Report and use surveillance information. In any system, it is critical that surveillance information is provided to and used by the relevant stakeholders; failure of either renders the surveillance program meaningless.
7. Evaluate the program. Surveillance activities should be evaluated periodically in any surveillance program. At a minimum, assessment of the acceptability of the surveillance program, the quality of the data, and any changes in the patient population that impact the relevance of the surveillance program should be conducted.

## 7.7. Methods of surveillance

“Passive surveillance” with reporting by individuals outside the IPC team (laboratory-based surveillance, extraction from medical records post-discharge, infection notification by physicians and nurses) is of low sensitivity and should not be performed. Therefore, some form of active surveillance for infections (referred to as prevalence or incidence studies) is recommended. Methods of surveillance could include:

- Active surveillance (prevalence and incidence studies)
- Targeted surveillance (site, unit, priority-oriented)
- Appropriately trained investigators

- Standardised methodology
- Risk-adjusted rates for comparisons

### 7.7.1 Prevalence study

Infections in all patients hospitalised at a given point in time are identified (point prevalence) in the entire facility, or on selected units. Typically, a team of trained investigators visits every patient of the hospital on a single day, review-data. The outcome measure is a prevalence rate.

Prevalence rates are influenced by duration of the patient's stay (infected patients stay longer, leading to an overestimation of patient's risk of acquiring an infection) and duration of infections. Another problem is determining whether an infection is still "active" on the day of the study. In small hospitals, or small units, the number of patients may be too few to develop reliable rates, or to allow comparisons with statistical significance.

The prevalence of an HAI is the proportion of patients who have active (new and previously diagnosed) HAI in a defined patient population during the surveillance period. These may be new cases, or cases that developed before the survey.

$$\text{Prevalence (\%)}: \frac{\text{number of new and existing cases of specific HAI during the specified survey period}}{\text{total number of patients surveyed for specific HAI during the specified survey period}} \times 100$$

In general, prevalence increases the longer the duration of the disease. Prevalence can be assessed at one single point in time (point prevalence) or over a defined time period (period prevalence). Since prevalence rates include new and existing infections, these cannot be compared with incidence rates, which include only new infections.

### 7.7.2 Incidence study

Prospective identification of new infection (Incidence surveillance) requires monitoring of all patients within a defined population for a specific time period.

Patients are followed throughout their stay, and sometimes after discharge (e.g., post-discharge surveillance for surgical site infections). This type of surveillance provides attack rates, infection ratio and incidence rates (Table 3). It is more effective in detecting differences in infection rates, to follow trends, to link infections to risk factors, and for inter-hospital and inter-unit comparisons.

This surveillance is more labour-intensive than a prevalence survey, more time-consuming, and costly. Therefore, it is usually undertaken only for selected high-risk units on an ongoing basis (i.e., in intensive care units), or for a limited period, focusing on selected infections and specialties (i.e., 3 months in surgery).

Common priority areas can include:

- Ventilator associated pneumonia
- Surgical site infections
- Intravascular device associated infections
- Multi-resistant organisms (MRO) (MRSA, extended spectrum beta-lactamase producing organisms)

The incidence of an HAI is a specific rate that represents the occurrence (number) of new cases of a disease (e.g., a specific HAI) occurring in a defined patient population during a defined period. All individuals in the population being surveyed must be at risk of developing the outcome. To calculate incidence, the number of patients at risk of the specific HAI during the surveillance period forms the denominator:

$$\frac{\text{number of patients diagnosed with new specific HAI during surveillance period}}{\text{number of patients at risk of the specific HAI during the surveillance period}} \times 100$$

## 7.8. Calculating rates of HAI

Rates are obtained by dividing a numerator (number of infections or infected patients observed) by a denominator (population at risk, or number of patient-days of risk). The frequency of infection can be estimated by prevalence and incidence indicators. For MRO surveillance, the three main indicators used are:

- Percentage of antimicrobial resistant strains within isolates of a species, e.g. percentage of Staphylococcus aureus resistant to methicillin (MRSA)
- Attack rate (e.g. number of MRSA/100 admissions)
- Incidence rate (e.g. MRSA/1000 patient-days)

For both prevalence and incidence rates, either the global population under surveillance, or only patients with a specific risk of exposure, may be the denominator.

Incidence rates are encouraged as they take into account the length of exposure, or the length of stay (and/or follow-up) of the patient, giving a better reflection of risk and facilitates comparison. Either patient-day rates or device-associated rates can be used.

### 7.8.1 Organisation for efficient surveillance

HAI surveillance includes data collection, analysis and interpretation, feedback leading to interventions for preventive action, and evaluation of the impact of these interventions. It is important that all those involved in surveillance undergo training, including training of HCWs responsible for data collection. A written HCF protocol must describe the methods to be used, the data to be collected (e.g. patient inclusion criteria, definitions), the analysis that can be expected, and preparation and timing of reports as well as roles and responsibilities.

### 7.8.2. Data collection and analysis

Data collection requires multiple sources of information as no method, by itself, is sensitive enough to ensure data quality. Trained data extractors performing active surveillance will increase the sensitivity for identifying infections.

Techniques for case finding include:

- Ward activity
  - The presence of devices or procedures known to be a risk for infection (indwelling urinary and intravascular catheters, mechanical ventilation, surgical procedures)
  - Record of fever or other clinical signs consistent with infection
  - Antimicrobial therapy
  - Laboratory tests
  - Medical and nursing chart review
  - Patient interview
- Laboratory reports
  - isolation of microorganisms potentially associated with infection, antimicrobial resistance patterns, serological tests. Microbiology laboratory reports have low sensitivity because cultures are not obtained for all infections, specimens may not be appropriate, some infectious pathogens may not be isolated (e.g. virus), and the isolation of a potential pathogen may represent colonization rather than infection (e.g. for surgical site infections, pneumonia). Laboratory reports are, however, reliable for urinary tract infection, bloodstream infections,
  - Other diagnostic tests: e.g. white blood counts, diagnostic imaging, autopsy data -Discussion of cases with clinical staff during periodic ward visits

Continuing collaboration among IPC staff, the laboratory where available, and clinical units will facilitate an exchange of information and improve data quality. The patient is monitored throughout the hospital stay, and in some cases (e.g. for surgical site infections), surveillance includes the post-discharge period. The progressive reduction of the average length of stay with recent changes in healthcare delivery increases the importance of identifying post discharge infections.

# Appendix 1: IPC Committee Terms of Reference

**PURPOSE**

The aim of the committee is to advise the Chief Executive Officer (CEO)/ Provincial Health Director on strategies required to prevent, reduce, treat and control infection among patients, clients and staff and to protect patients, clients and staff against potential infection.

**OBJECTIVES**

- Determine and monitor the incidence of infections among patients, clients and staff.
- Identify, implement and monitor strategies to prevent, reduce, treat, and control infection among patients, clients and staff.
- Develop, maintain and review regularly infection control guidelines and procedure manual and ensure an understanding of infection control principles and access to the manual by staff.
- Identify appropriate criteria and indicators with which to monitor and regularly report on the effectiveness of and adherence to the infection control guidelines and procedure.
- Investigate, review and report on hospital and health service acquired infections by patients, clients and staff and to ensure that an effective mechanism exists to respond to issues identified and that these areas are effectively addressed.
- Review regularly cleaning, sterilizing, maintenance, materials handling, storage and disposal practices to ensure that these practices facilitate and maintain effective and efficient infection control.
- Monitor the use and effectiveness of pharmaceuticals and other therapeutic agents for the treatment of infections and provide advice on strategies required to maintain therapeutic effectiveness and to minimize any resistance.
- Ensure compliance with all relevant statutory and other requirements relating to infection control.
- Establish sub-committees and working groups and co-opt other members as required and to receive and take appropriate action on their reports and recommendations.

**COMMITTEE MEMBERSHIP**

- The Head of the Hospital or Healthcare facility or his/her designate
- The senior administrative officer who is in a position to allocate necessary resources etc
- IPC Nurse/Officer/team
- One or more senior medical officers
- Midwife or doctor working in obstetrics
- Housekeeper
- Operating room staff responsible for sterilisation
- Clinical Microbiologist or microbiology technician or laboratory personnel
- Pharmacist
- Chair of the AMR Committee

**AUTHORISATION OF THE COMMITTEE**

- The Infection Prevention and Control Committee is authorized by the Chief Executive officer/Provincial Health Director
- The Committee is a "Standing Committee"

**MEETINGS**

- A quorum for the committee to begin and transact business is half plus one (to be decided at the initial meeting)
- The business of the Committee shall be formally conducted and all recommendations properly recorded.
- An Agenda and Action List shall accompany the minutes of the previous meeting one (1) week prior to such meetings.
- Meetings will be of no more than 2 (2) hours duration initially then 1 (1) hour.
- Secretariat is the Infection Control Officer
- Consensus is the preferred method for this committee with voting a last resort. Should a vote be necessary, an item shall be deemed to be carried by a majority decision.

**COMMITTEE RECOMMENDATIONS AND REPORTING.**

- The Committee reports through the Nursing Superintendent/Director of Nursing Services and provides advice to the Chief Executive Officer/Provincial Health Director

# Appendix 2: IPC Officer Position Description

**Position: Infection Prevention and Control Nurse/Officer**

**Primary purpose**

Responsible for the overall co-ordination, implementation and monitoring of the infection prevention and control (IPC) policies and procedures, conduct relevant training, education and provision of relevant advice in hospitals and other health facilities.

**Duties and responsibilities**

1. Maintain close liaison with all departments to provide advice on matters relating to infection control and to ensure adherence on IPC guidelines.
2. Ensure ongoing review and update of all policies and procedures in relation to IPC in line with new research and development.
3. Participate as the principal working member of the IPC Committee and act as secretary to the committee.
4. Deliver verbal and written infection control reports in the required format to the IPC Committee.
5. Design and deliver IPC education including orientation and maintain ongoing programs for all staff.
6. Investigate specific outbreaks of healthcare associated infection in order to identify specific procedures that may constitute a risk of infection transmission.
7. Review usage of all chemical cleaning products and antiseptics to ensure appropriateness of products and usage.
8. Ensure appropriate follow up of staff who experience occupational exposure involving blood and body substances.
9. Be involved in the development of staff health programs in relation to hepatitis B immunisations and any other infectious disease related matter.
10. Establish and maintain ongoing surveillance on the occurrence of healthcare associated infection.
11. Develop, update and implement infection prevention techniques according to current standards of practice, which provide optimum care to patients and a safe workplace to employees.

## Appendix 3: My 5 Moments. Focus on caring for a patient with a urinary catheter

# My 5 Moments for Hand Hygiene

## Focus on caring for a patient with a Urinary Catheter

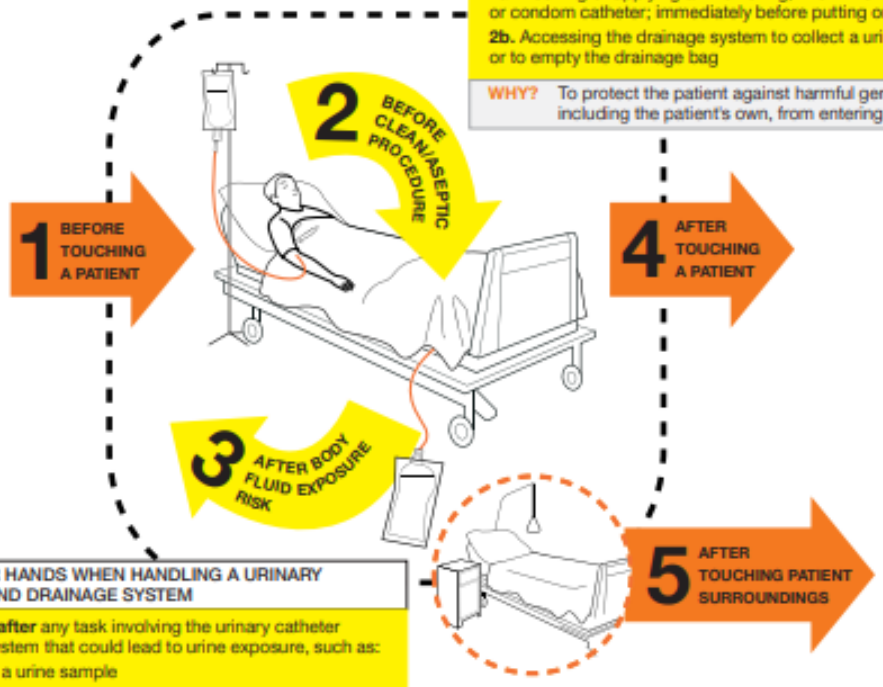
**CLEAN YOUR HANDS WHEN HANDLING A URINARY CATHETER AND DRAINAGE SYSTEM**

**Immediately before** any manipulation of the urinary catheter or drainage system that could lead to contamination of the sterile urine, such as:

**2a.** Inserting or applying an indwelling, intermittent straight, or condom catheter; immediately before putting on sterile gloves

**2b.** Accessing the drainage system to collect a urine sample or to empty the drainage bag

WHY? To protect the patient against harmful germs, including the patient's own, from entering his/her body.




**CLEAN YOUR HANDS WHEN HANDLING A URINARY CATHETER AND DRAINAGE SYSTEM**

**Immediately after** any task involving the urinary catheter or drainage system that could lead to urine exposure, such as:

**3a.** Collecting a urine sample

**3b.** Emptying the drainage bag

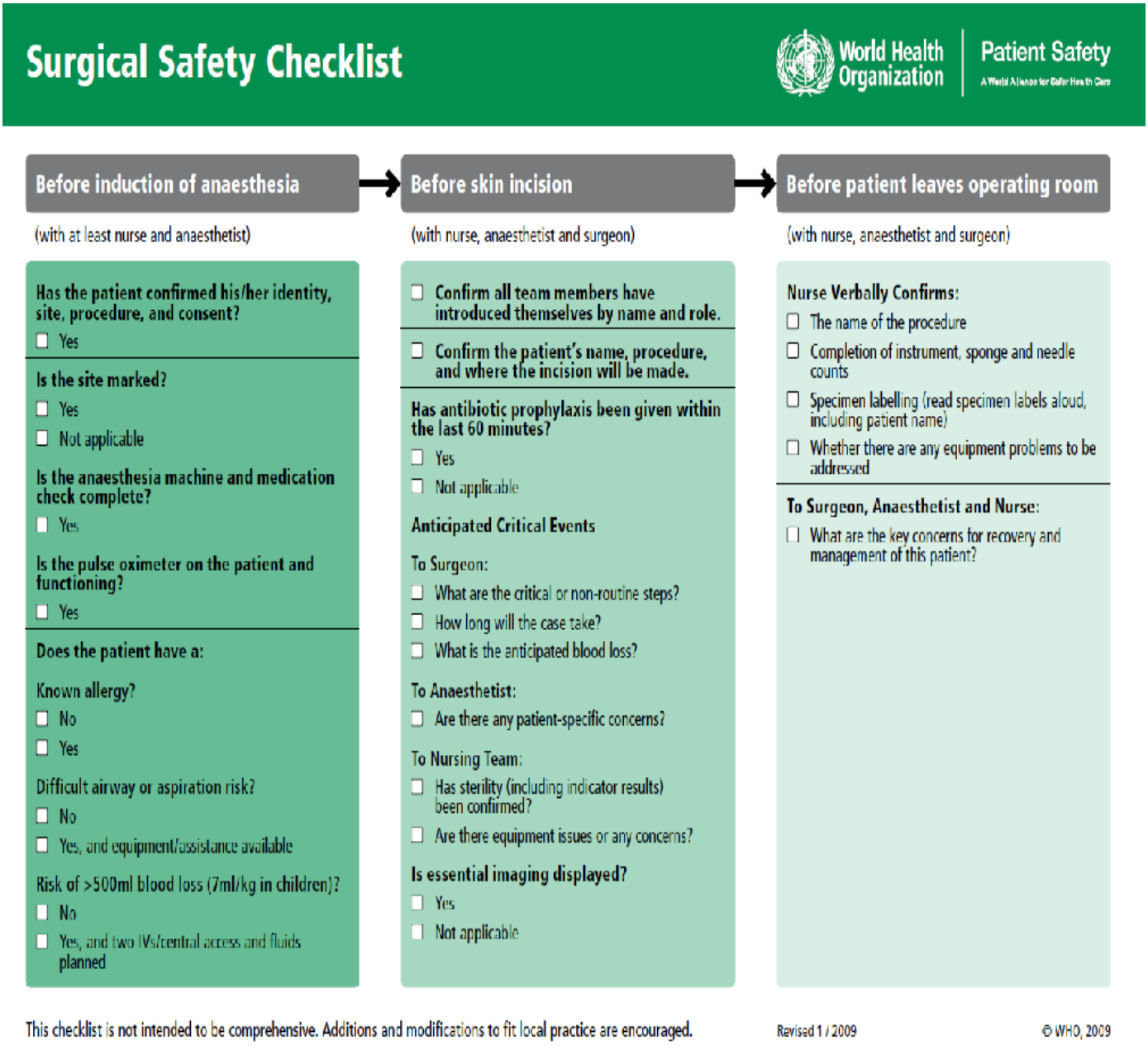
**3c.** Removing the urinary catheter

WHY? To protect yourself and the health-care environment from harmful patient germs.

### 5 KEY ADDITIONAL CONSIDERATIONS FOR A PATIENT WITH A URINARY CATHETER

- Make sure that there is an appropriate indication for the indwelling urinary catheter.
- Use a closed urinary drainage system, and keep it closed.
- Insert the catheter aseptically using sterile gloves.
- Assess the patient at least daily to determine whether the catheter is still necessary.
- Patients with indwelling urinary catheters do not need antibiotics (including for asymptomatic bacteriuria), unless they have a documented infection.

## Appendix 4: Surgical Safety Checklist



# Surgical Safety Checklist

World Health Organization | Patient Safety
A World Alliance for Safer Health Care

### Before induction of anaesthesia
(with at least nurse and anaesthetist)

**Has the patient confirmed his/her identity, site, procedure, and consent?**
- ☐ Yes

**Is the site marked?**
- ☐ Yes
- ☐ Not applicable

**Is the anaesthesia machine and medication check complete?**
- ☐ Yes

**Is the pulse oximeter on the patient and functioning?**
- ☐ Yes

**Does the patient have a:**

Known allergy?
- ☐ No
- ☐ Yes

Difficult airway or aspiration risk?
- ☐ No
- ☐ Yes, and equipment/assistance available

Risk of >500ml blood loss (7ml/kg in children)?
- ☐ No
- ☐ Yes, and two IVs/central access and fluids planned

### Before skin incision
(with nurse, anaesthetist and surgeon)

- ☐ **Confirm all team members have introduced themselves by name and role.**
- ☐ **Confirm the patient's name, procedure, and where the incision will be made.**

**Has antibiotic prophylaxis been given within the last 60 minutes?**
- ☐ Yes
- ☐ Not applicable

**Anticipated Critical Events**

To Surgeon:
- ☐ What are the critical or non-routine steps?
- ☐ How long will the case take?
- ☐ What is the anticipated blood loss?

To Anaesthetist:
- ☐ Are there any patient-specific concerns?

To Nursing Team:
- ☐ Has sterility (including indicator results) been confirmed?
- ☐ Are there equipment issues or any concerns?

**Is essential imaging displayed?**
- ☐ Yes
- ☐ Not applicable

### Before patient leaves operating room
(with nurse, anaesthetist and surgeon)

**Nurse Verbally Confirms:**
- ☐ The name of the procedure
- ☐ Completion of instrument, sponge and needle counts
- ☐ Specimen labelling (read specimen labels aloud, including patient name)
- ☐ Whether there are any equipment problems to be addressed

**To Surgeon, Anaesthetist and Nurse:**
- ☐ What are the key concerns for recovery and management of this patient?

This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.

Revised 1 / 2009

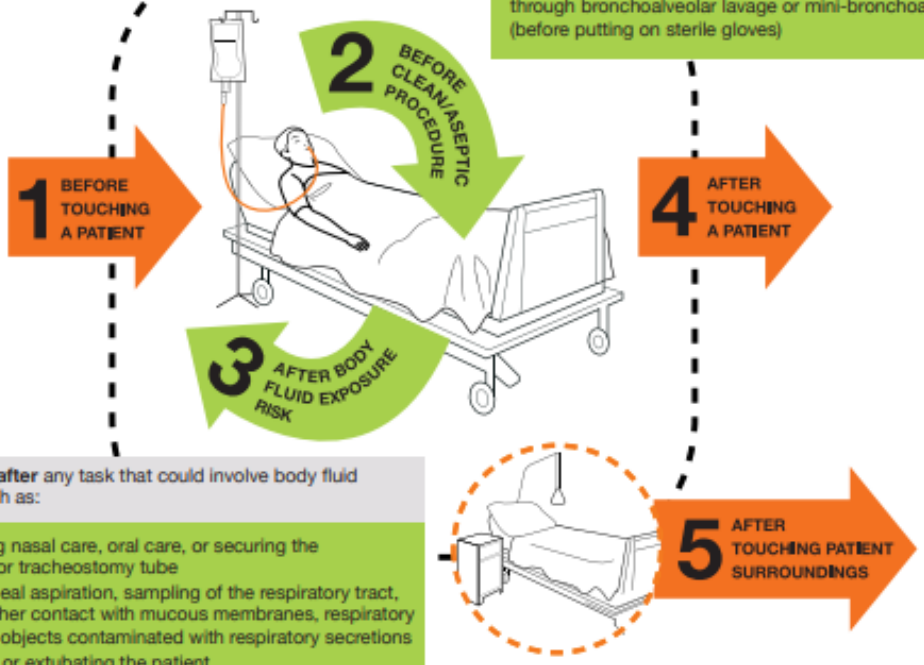
Appendix 5: My 5 Moments. Focus on caring for a patient with an Endotracheal tube

# My 5 Moments for Hand Hygiene

## Focus on caring for a patient with an endotracheal tube

**Immediately before** any manipulation of the endotracheal tube and any respiratory tract care, such as:

**2a.** Performing nasal care, oral care, or securing the endotracheal or tracheostomy tube (before putting on clean, non-sterile gloves)
**2b.** Endotracheal aspiration or sampling of the respiratory tract through bronchoalveolar lavage or mini-bronchoalveolar lavage (before putting on sterile gloves)




**Immediately after** any task that could involve body fluid exposure, such as:

**3a.** Performing nasal care, oral care, or securing the endotracheal or tracheostomy tube
**3b.** Endotracheal aspiration, sampling of the respiratory tract, or after any other contact with mucous membranes, respiratory secretions, or objects contaminated with respiratory secretions
**3c.** Intubating or extubating the patient

### Key additional considerations for adult patients with endotracheal tubes

- Avoid intubation and use non-invasive ventilation whenever appropriate.
- If possible, provide endotracheal tubes with subglottic secretion drainage ports for patients likely to require more than 48 hours of intubation.
- Elevate the head of the bed to 30°–45°.
- Manage ventilated patients without sedatives whenever possible.
- Assess readiness for extubation every day by performing spontaneous breathing trials with sedatives turned off (in patients without contraindications).
- Perform regular oral care aseptically using clean, non-sterile gloves.
- Facilitate early exercise and mobilization to maintain and improve physical condition.
- Change the ventilator circuit only if visibly soiled or malfunctioning.

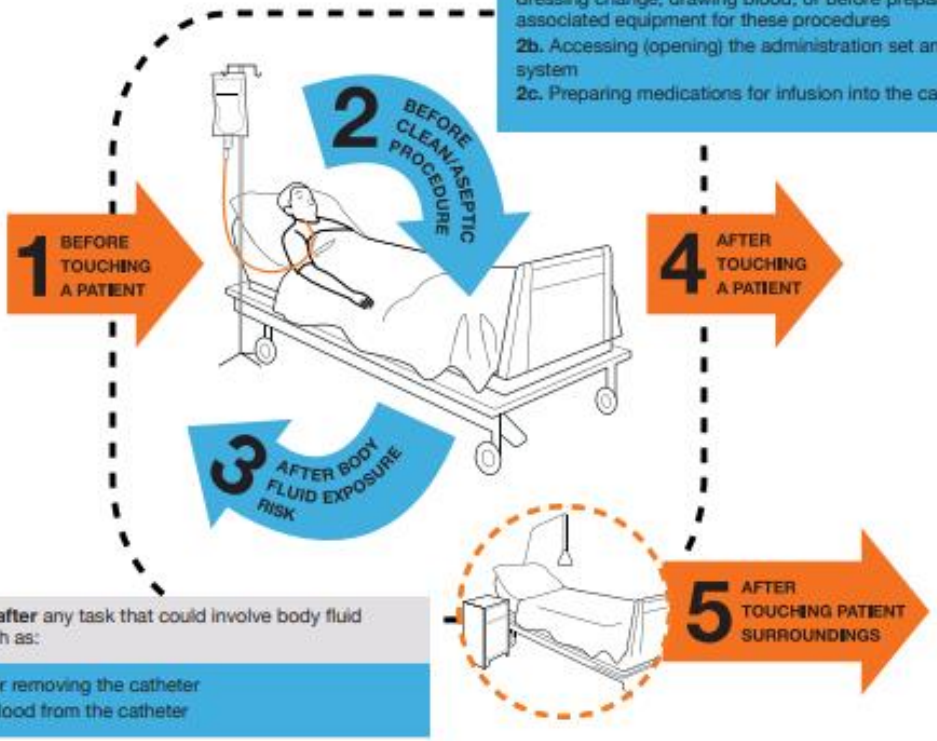
Appendix 6: My 5 Moments. Focus on caring for a patient with a central venous catheter

# My 5 Moments for Hand Hygiene

## Focus on caring for a patient with a central venous catheter

**Immediately before** any manipulation of the catheter and the associated intravenous medication administration system, such as:

**2a.** Catheter insertion (before putting on sterile gloves), catheter removal (before putting on clean, non-sterile gloves), dressing change, drawing blood, or before preparing associated equipment for these procedures
**2b.** Accessing (opening) the administration set and infusion system
**2c.** Preparing medications for infusion into the catheter




**Immediately after** any task that could involve body fluid exposure, such as:

**3a.** Inserting or removing the catheter
**3b.** Drawing blood from the catheter

### Key additional considerations for central intravenous catheters

1. **Indication:** Ensure that a central intravenous catheter is indicated. Remove the catheter when no longer needed/clinically indicated.
2. **Insertion/maintenance/removal**

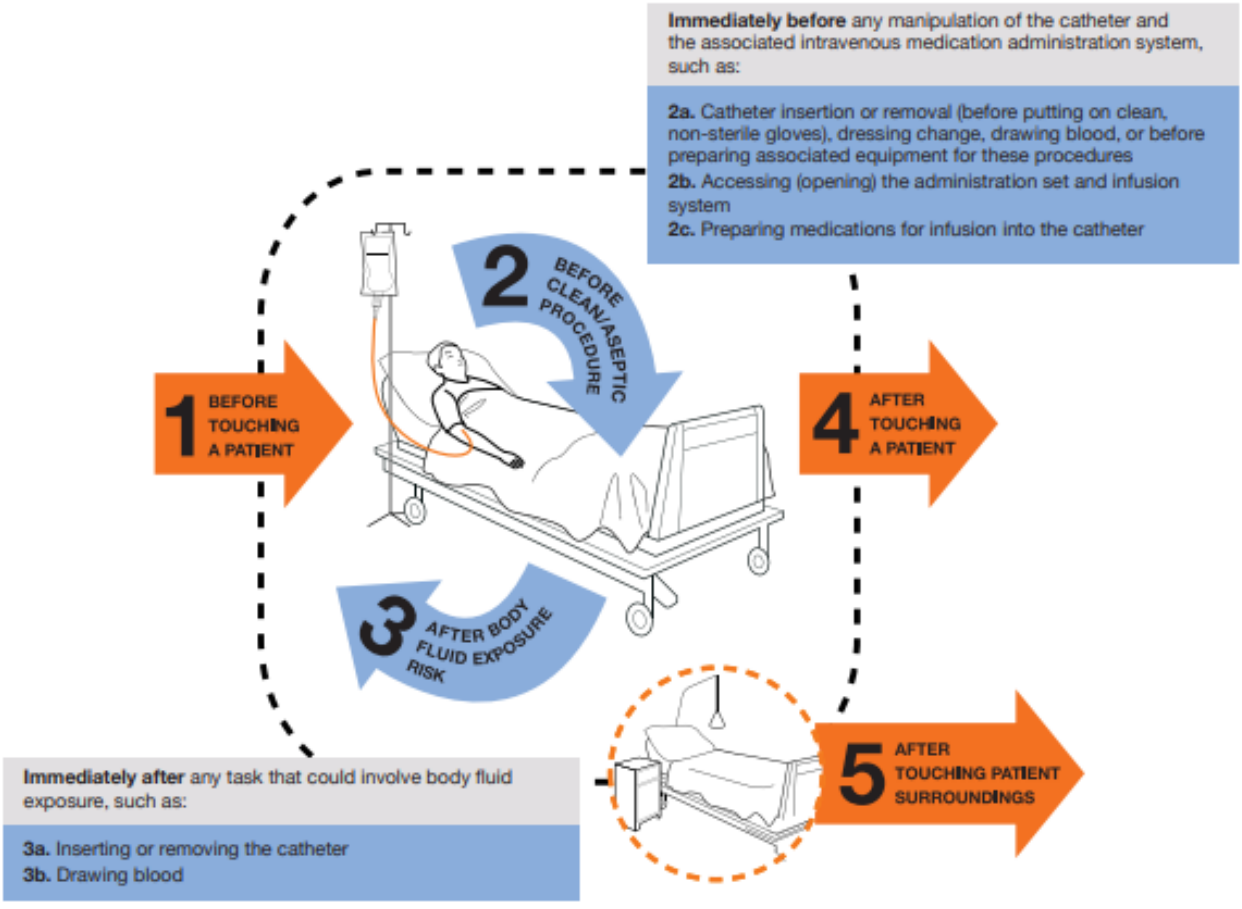
2.1 Avoid inserting catheters into the femoral vein.
2.2 Prepare clean skin with an antiseptic (alcohol-based 2% chlorhexidine-gluconate preferred) before insertion.
2.3 Use full sterile barrier precautions during insertion (cap, surgical mask, sterile gloves, sterile gown, large sterile drape).
2.4 Replace gauze-type dressings every 2 days and transparent dressings every 7 days; replace dressings whenever visibly soiled.
2.5 Change tubing used to administer blood, blood products, chemotherapy, and fat emulsions within 24 hours of infusion start. Consider changing all other tubing every 96 hours.
2.6 Use aseptic procedure (with non-touch technique) for all catheter manipulations.
2.7 "Scrub the hub" with alcohol-based chlorhexidine-gluconate for at least 15 seconds.

3. **Monitoring:** Record time and date of catheter insertion, removal and dressing change, and condition (visual appearance) of the catheter skin site every day.

Appendix 7: My 5 Moments. Focus on caring for a patient with a peripheral venous catheter

# My 5 Moments for Hand Hygiene

## Focus on caring for a patient with a peripheral venous catheter




### Key additional considerations for peripheral intravenous catheters

1. Indication: Ensure that a peripheral venous catheter is indicated. Remove the catheter when no longer necessary/clinically indicated.
2. Insertion/maintenance/removal
2.1 Prepare clean skin with an antiseptic (70% alcohol, tincture of iodine, an iodophor, or alcohol-based 2% chlorhexidine gluconate) before catheter insertion.
2.2 Wear clean, non-sterile gloves and apply an aseptic procedure (with non-touch technique) for catheter insertion, removal, and blood sampling.
2.3 Replace any dry gauze-type dressings every 2 days.
2.4 Consider scheduled catheter change every 96 hours.
2.5 Change tubing used to administer blood, blood products, chemotherapy, and fat emulsions within 24 hours of infusion start. Consider changing all other tubing every 96 hours.
3. Monitoring: Record time and date of catheter insertion, removal and dressing change, and condition (visual appearance) of catheter site every day.

## Appendix 8: How to hand wash

# How to Handwash?

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB

**Duration of the entire procedure:** 40-60 seconds

0

Wet hands with water;

1

Apply enough soap to cover all hand surfaces;

2

Rub hands palm to palm;

3

Right palm over left dorsum with interlaced fingers and vice versa;

4

Palm to palm with fingers interlaced;

5

Backs of fingers to opposing palms with fingers interlocked;

6

Rotational rubbing of left thumb clasped in right palm and vice versa;

7

Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;

8

Rinse hands with water;

9

Dry hands thoroughly with a single use towel;

10

Use towel to turn off faucet;

11

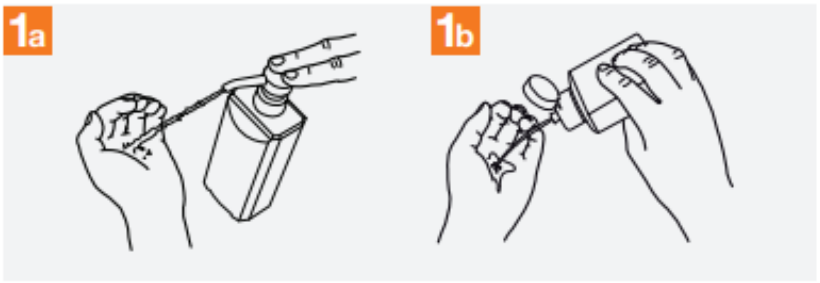
Your hands are now safe.

## Appendix 9: How to hand rub

# How to Handrub?

**RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED**

**Duration of the entire procedure: 20-30 seconds**




Apply a palmful of the product in a cupped hand, covering all surfaces;

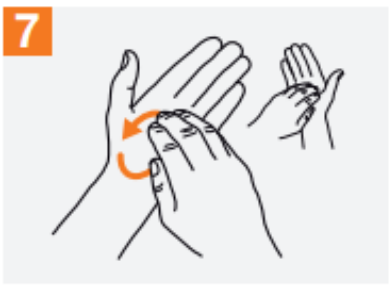

Rub hands palm to palm;


Right palm over left dorsum with interlaced fingers and vice versa;

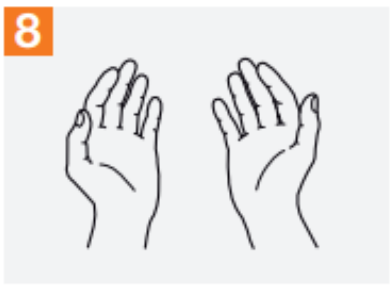

Palm to palm with fingers interlaced;


Backs of fingers to opposing palms with fingers interlocked;


Rotational rubbing of left thumb clasped in right palm and vice versa;




Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;




Once dry, your hands are safe.

## Appendix 10: How to put on/take off PPE

HOW TO PUT ON AND TAKE OFF

# Personal Protective Equipment (PPE)

World Health Organization

### How to put on PPE (when all PPE items are needed)

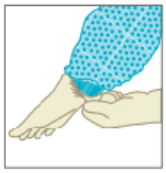
**Step 1**
- Identify hazards & manage risk. Gather the necessary PPE.
- Plan where to put on & take off PPE.
- Do you have a buddy? Mirror?
- Do you know how you will deal with waste?

**Step 2**
- Put on a gown.

**Step 3a** OR **Step 3b**
- Put on face shield.
- Put on medical mask and eye protecton (e.g. eye visor/goggles)

+

***Note:*** If performing an aerosol-generating procedure (e.g. aspiration of respiratory tract, intubation, resuscitation, bronchoscopy, autopsy), a particulate respirator (e.g. US NIOSH-certified N95, EU FFP2, or equivalent respirator) should be used in combination with a face shield or an eye protection. Do user seal check if using a particulate respirator.



**Step 4**
- Put on gloves (cver cuff).

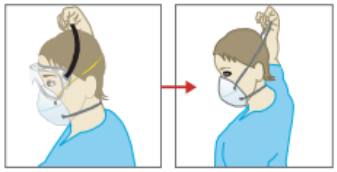
### How to take off PPE

**Step 1**
- Avoid contamination of self, others & the environment
- Remove the most heavily contaminated items first

***Remove gloves & gown***
- Peel off gown & gloves and roll inside, out
- Dispose gloves and gown safely

**Step 2**
- Perform hand hygiene

**Step 3a**
**If wearing face shield:**
- Remove face shield from behind
- Dispose of face shield safely



**Step 3b**
**If wearing eye protection and mask:**
- Remove goggles from behind
- Put goggles in a separate container for reprocessing
- Remove mask from behind and dispose of safely

**Step 4**
- Perform hand hygiene

# Appendix 11: Recommended cleaning schedule

The table outlines a cleaning schedule guide for healthcare facilities to use to develop their local schedule to suit their environment.

| **Level of Risk** | **Area/Ward** |
|---|---|
| Very High Risk | Outbreak area |
| High Risk | Intensive care units, operating theatres, burns units, dialysis units post-operative care units |
| Significant Risk | General wards |
| Low Risk | Office area, non-clinical areas |
| Level 1 | Detergent |
| Level 2 | Disinfectant for MRO and Detergent (disinfectant should have a label indicating evidence against the organism of concern |

| **Item** | **MINIMUM CLEANING FREQUENCY** | | | | **Method** |
|---|---|---|---|---|---|
| | **Very High Risk** | **High Risk** | **Significant Risk** | **Low Risk** | |
| Bathrooms | Daily after use | Daily after use | Daily after use | Daily after | 1<br>2 |
| Bed | Daily & after discharge | Daily & after discharge | Daily & after discharge | After discharge | 1<br>2 |
| | Weekly & at discharge under bed | Weekly & at discharge under bed | Weekly and at discharge under bed | | 1<br>2 |
| bedrails<br>Bedside table and lockers | Twice daily and at discharge | Twice Daily and at discharge | Daily and at discharge | Weekly and at discharge | 1<br>2 |
| Catheter stands and brackets | Clean daily and after use | Clean daily and after use | Clean before and after use | Clean before and after use | 1 |
| Ceiling | Spot clean and yearly | Spot clean and yearly | Spot clean and yearly | Spot clean and yearly | 1 |
| Chairs | Twice daily | Twice daily | Daily and at discharge | Daily & at discharge | 1<br>2 |
| Cleaning equipment | Clean after use | Clean after use | Clean after use | Clean after use | 1<br>2 |
| clipboards | Daily and between patient use | Daily and between patient use | Daily and between patient use | Daily and between patient use | 1 |
| Commode | After use and daily | After use and daily | After use and daily | After use and daily | 1<br>2 |
| Computer and key boards | Weekly | weekly | weekly | weekly | 1 |
| Curtains | After discharge | monthly | biannually | annually | Laundry wash |
| Door knobs and handles | Twice daily | daily | daily | weekly | 1<br>2 |
| Floor | Damp mob twice daily | daily | daily | daily | 1<br>2 |

| ITEM | MINIMUM CLEANING FREQUENCY | | | | METHOD |
|---|---|---|---|---|---|
| | **Very High Risk** | **High Risk** | **Significant Risk** | **Low Risk** | |
| Mattress | Weekly and after discharge | Weekly and after discharge | After discharge | After discharge | 1<br>2 |
| Medical equipment (infusion pumps) not connected to patient | Daily between patient use | Daily between patient use | Daily between patient use | weekly between patient use | 1<br>2 |
| Medical Gas | daily | daily | daily | weekly | 1 |
| Neubulizer machine | Daily after use | Daily after use | Daily after use | Daily after use | 1 |
| Oxygen equipment | Daily after use | Daily after use | Daily after use | Daily after use | 1 |
| Pillows (waterproof cover) | Weekly and after discharge | After discharge | After discharge | After discharge | 1<br>2 |
| Dressing Trolleys | Before & after use | before & after use | Before & after use | before & after use | 1<br>2 |
| Sinks (hand washing) | Twice daily | daily | daily | daily | 1 |
| General surfaces in patients room | Twice daily and after discharge | Twice daily and after discharge | Daily and after discharge | Weekly and after discharge | 1<br>2 |
| telephones | Twice daily | Twice daily | Daily | weekly | 1 |
| Toilet | Twice daily | Twice daily | Twice daily | daily | 1 |
| Trolley Linen | daily | daily | Daily | weekly | 1 |
| Trolley resuscitation | daily | daily | Daily | weekly | 1 |
| walls | Spot clean | Spot clean | Spot clean | Spot clean | 1 |
| Patient bowls | Between use | Between use | Between use | Between use | 1<br>2 |
| Wheelchair | Daily and after use | Daily and after use | Monthly and after use | Monthly and after use | 1 |
| Waste Bins | weekly | Weekly | weekly | Weekly | 1 |

Adapted from: Australian Guidelines Prevention and Control of Infection in Healthcare (2010)

# Appendix 12: Reporting and management of occupational exposures

Hospital or workplace:_____
Report completed by:_____
Date & time of exposure:_____
Date & time of report:_____

1. The injury occurred in which work area?

- ❑ Medical ward
- ❑ Surgical ward
- ❑ Operating room
- ❑ ICU
- ❑ Nursery
- ❑ Labor ward
- ❑ Laboratory
- ❑ Other _____

2. Job classification of the injured worker?

- ❑ Dentist
- ❑ Technician
- ❑ Housekeeper/laundry
- ❑ Doctor
- ❑ Nurse
- ❑ Student
- ❑ Security
- ❑ Other_____

3. How did the incident occur?

- ❑ Patient moved and jarred device
- ❑ While inserting needle in line or patient
- ❑ While withdrawing needle from line/patient
- ❑ Passing/transferring equipment
- ❑ Suturing
- ❑ Recapping
- ❑ Disassembling device/equipment
- ❑ Opening/breaking glass container
- ❑ Injured by sharp being disposed
- ❑ Over-filled sharps container
- ❑ Sharp in in-proper place (general waste, linen etc.)

4. What type of device caused the injury?

- ❑ Hollow bore needle
- ❑ Glass object
- ❑ Non-healthcare item
- ❑ Other sharp object
- ❑ Unknown
- ❑ Other _____

5. When in the use of the object did the exposure occur?

- ❑ Before contact with source blood or body fluid
- ❑ Following contact with source blood or body fluid
- ❑ Unknown
- ❑ Other _____

6. Type of exposure

- ❑ Percutaneous
- ❑ Mucous membrane
- ❑ Non-intact skin
- ❑ Intact skin

7. Part of body injured:_____
_____
_____
_____

8. Type of body fluid exposed to:

9. Was first aid given? YES NO

10. Were gloves worn? YES NO

11. Was staff member vaccinated against Hepatitis B? YES NO

12. When was vaccination given (year)? _____

13. Post immunization HBsAb tested? YES NO

14. Was Hepatitis B immunoglobulin given? YES NO

15. Is anti-retroviral therapy required? YES NO

16. Baseline Serology
(if performed/consented)

HBV
HCV
HIV
Other

Follow up required? YES NO

17. Considered immune? YES NO

18. Was physician on-call contacted? YES NO

SOURCE FOLLOW UP

Source name (if known):_____

Source agreed to blood tests? YES NO

**CONSENT FORM FOR POST-EXPOSURE PROPHYLAXIS**

I, ……, have been duly provided with all the necessary information in order for me to make an informed choice. I therefore accept/not accept [delete one] post -exposure prophylaxis as per Needle-Stick Injury Protocol.

_____

Signature of exposed HCW

_____

Signature of Attending Clinician

**Completed forms must be submitted to the infection control officer**

**HIV COUNSELLING FORM CHECKLIST**

1. **What the test means:**
    - **Elisa** test is looking for antibodies, not the virus itself.
    - **Time Frame** "Window Period": 2–12 weeks.

2. **What a positive result means with regards to:**
    - Medical Aspects.
    - The infection is life long and you can pass on the virus from time of infection.
    - Modes of transmission are from exposure to blood and body fluids i.e. through a needle stick injury, sexual intercourse with an infected partner or sharing of used needles and syringes.
    - Medical progression is such that you may be well for many years before experiencing other symptoms progressing to **AIDS.**

3. **Psychological aspects:**
    - Thinking through possible results.
    - Have you thought about the test being positive? How do you think you would feel?
    - Assessing coping ability. How have you coped before with stressful life events?
    - Back up services available if unable to cope while waiting for results.

4. **Notification requirements:**
    - **HIV** positive results – testing laboratory notifies Ministry of Health – all that is required is:
        - **DOB:**
        - **SEX:**
        - **MODE OF TRANSMISSION:**

5. **Social aspects:**
    - Client`s legal obligation – inform current and future sexual partners of infection.
    - Discussion re: family, friends and support.
    - Need for care re disclosure – should your test be positive – be selective who you discuss this with.
    - Implications for travel, housing, employment.

6. **Travel:**
    - Some countries will not allow HIV positive people to visit i.e. America.
    - Other countries will not allow HIV positive people to work and for this reason when applying for an overseas work permit you may be asked to supply a recent HIV result – Countries include Australia and the Emirates.
7. **Housing:**
    - People who are HIV positive may also experience some difficulties with long term housing loans.

8. **What a negative result means:**
    - Interpreted in relation to time frame of test/risk practices

9. **Preventive aspects (whatever the test result):**
    - Safer needle and syringe use
    - Reinforce non sharing of needle and syringes
    - Safer sex practices.
    - Information re condoms, high and low risk sexual practices. Check the expiry date on condoms and if this is a month of expiring, a new pack should be used. Also give instructions on how to apply a condom in the correct way i.e. Ensure the air bubble at the end of the condom is firmly clasped expelling the air while rolling down the shaft of the penis.

10. **How results of tests are obtained:**
    - All staff MUST receive results **face to face, never over the phone.**

11. **Counselling on drug therapy:**

- Toxicity and side effects profile of drugs. Patients must be made fully aware of the associated side effects of these drugs.
- Monitoring and evaluation of Post Exposure Prophylaxis.

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