
# South Sudan National IPC Guidelines

2023

# Foreword

The mission of the Ministry of Health South Sudan, is, "To improve health status of the people by effective delivery of the Basic Package of Health and Nutrition Services (BPHNS) through provision of Health promotion, disease, injury and disability prevention, treatment, and rehabilitation services, with full participation of the people with an objective to strengthen health service organisation and infrastructure development for effective and equitable delivery of the BPHNS, and Universal Health Coverage. The safety of health service delivery is measured through reduced HealthCare Associated Infections and combating of Anti-Microbial Resistance. This is only possible if we follow the rules of duty of care to the patient which is "do no harm". To achieve this, Infection Prevention and Control (IPC) plays an integral part in ensuring "no harm befalls the patient and the healthcare worker".

Over the years, major outbreaks have shown that pathogens can spread fast in healthcare settings with transmission even reaching communities. IPC has proven to be effective in minimising and controlling the risks of infections as it uses evidence-based strategies. IPC in South Sudan has been more of an outbreak response strategy and it is time, IPC, is incorporated in the daily healthcare setting routines and processes.

The IPC Global report of 2022 highlighted that, many countries in the low- and middle-income settings do not have strong IPC Programs in place, as a result, in the 75th World Health Assembly a resolution was made that Member States must improve IPC at National, Sub-National and /or facility level. To this effect, a Global Strategy on IPC was adopted, and South Sudan participated in the Consultative process held in the AFRO Region.

In alignment with the World Health Assembly and the Draft Global Strategy on IPC, South Sudan embarked on the journey to institutionalize Infection Prevention and Control, and to date, significant strides have been made to try and achieve this goal. The country has since appointed a full time National IPC Focal Person, identified, and trained a multi-disciplinary Core (Technical Working Group) that underwent a competency-based course on IPC for Managers. Furthermore, the country developed a National IPC Strategic Plan (2022-2026) which is in its second year of implementation. For IPC to be realised in all levels of care, regulatory tools have to be in place to guide in implementation and realising the goal of reduction in HealthCare Associated Infections and combating AMR.

The development of the first IPC Guidelines grounded on evidence-based practices comes at a time when the country is harnessing the gains from the recent COVID19 pandemic where IPC awareness was heightened and there is need to set up guidelines which guide Healthcare Workers to adhere to standards that improve patient outcomes and protect the HealthCare workers and communities.

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## Sources

The South Sudan National IPC Guidelines have been developed in accordance with International best practices and in line with WHO Core Components and Minimum Requirements for IPC Programs.

Other Guidelines used to inform development were from various WHO Guidelines ,WHO AFRO, CDC, Africa CDC, Resolve to Save Lives and Infection Control Africa Network.

Other national guidelines have been consulted during the development phase including Sierra Leone National IPC Guidelines of 2022, the National Guidelines on Infection Prevention and Control 2020 of the National Institute of Health, Pakistan and the Australian Guidelines for the Prevention and Control of Infection in Healthcare (2019) ,

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## Abbreviations and Acronomys

| | |
|---|---|
| **ABHR** | Alcohol-based hand rub |
| **AMR** | Antimicrobial resistance |
| **BSI** | Bloodstream infection |
| **CAUTI** | Catheter-associated urinary tract infection |
| **CC** | Core component |
| **CDC** | Centers for Disease Control and Prevention (USA) |
| **CLABSI** | Central line-associate bloodstream infections |
| **CRAB** | Acinetobacter Baumannii |
| **CRE** | Carbapenem Resistant Enterobacteriaceae |
| **CRO** | Carbapenem Resistant Organisms |
| **CSU** | Catheter Stream Urine |
| **CSSD** | Central Sterile Services Department |
| **ECDC** | European Centers for Disease Control and Prevention |
| **FP** | Focal point |
| **HAI** | Healthcare-associated infection |
| **HAP** | Hospital-acquired pneumonia |
| **HBsAg** | Hepatitis B Surface Antigen |
| **HBIG** | Hepatitis B Immune Globulin |
| **HBV** | Hepatitis B Virus |
| **HCF** | Health care facility |
| **HCW** | Healthcare waste |

| | |
|---|---|
| **HH** | Hand hygiene |
| **HIC** | High income countries |
| **HIV** | Human Immuno-deficiency Virus |
| **HLD** | High level disinfectant |
| **ICU** | Intensive care unit |
| **ILO** | International Labour Organisation |
| **IPC** | Infection prevention and control |
| **IPCAF** | Infection prevention and control assessment framework |
| **IPCAT** | Infection prevention and control assessment tool |
| **IV** | Intravenous |
| **LMIC** | Low-middle- income countries |
| **MDR** | Multidrug resistant |
| **MDV** | Multidose vials |
| **MMIS** | Multimodal Improvement Strategy |
| **MoH** | Ministry of Health |
| **MR** | Minimum requirement |
| **MRSA** | Methicillin resistant *Staphylococcus aureus* |
| **MSDS** | Material Safety Data Sheet |
| **MSU** | Midstream Urine |
| **NPHL** | National Public Health Laboratory |
| **OT** | Operating Theatre |
| **PEP** | Post Exposure Prophylaxis |
| **PHC** | Primary Health Care |
| **PPE** | Personal protective equipment |
| **PPM** | Parts per million |
| **PTB** | Pulmonary Tuberculosis |
| **PVC** | Polyvinyl Chloride |
| **QA** | Quality Assurance |
| **QI** | Quality Improvement |
| **RIT** | Repeat infection timeframe |
| **RTI** | Respiratory tract infection |
| **SED** | Safety Engineered Devices |
| **SOP** | Standard operating procedures |
| **SP** | Standard Precautions |
| **SSI** | Surgical site infection |
| **TBIC** | TB Infection Control |

| | |
|---|---|
| **TWG** | Technical working group |
| **UNICEF** | United nations children's fund |
| **USA** | United States of America |
| **VAP** | Ventilator-associated pneumonia |
| **VHF** | Viral Haemorrhagic Fever |
| **WASH** | Water, sanitation, and hygiene |
| **WASH FIT** | Water, sanitation and hygiene facility improvement tool |
| **WHO** | World health organization |

## Glossary of terms

**Aseptic (clean) procedure:** Any care activity that implies a direct or indirect contact with a mucous membrane, non-intact skin or an invasive medical devise. During such a procedure no micro-organisms should be transmitted.

**Antiseptic:** A chemical substance which is used to reduce bacteria from the skin surface. These are not interchangeable with surface disinfectants which should never be used on the skin. There are two antiseptics which have a sustained anti-microbial action - Chlorhexidine and Povidone Iodine.

**Antibiotic:** Any class of organic or synthetic molecule that inhibits or kills microbes by specific interactions with bacterial targets, without any consideration of the source of the particular compound or class.

**Antimicrobial:** A general term referring to a group of drugs, that includes antibiotics, antifungals, antiprotozoal drugs and antivirals that inhibit the growth of micro-organisms.

**Antimicrobial resistance (AMR):** One or more changes occurring in a microbe that renders an antimicrobial used to treat or prevent infections caused by it, ineffective. It is sometimes used interchangeably with the more focused term, antibiotic resistance.

**Bioburden:** Bioburden is defined as the number of micro-organisms found on a surface (living or inanimate) before undergoing a process of decontamination.

**Biohazard:** Matter or items that contain living microorganisms that might be/are hazardous to a handler's health.

**Body fluids:** Any substance/fluid from the body: blood, excrement (namely urine, stools, vomit, meconium, lochia), secretions (namely, saliva, mucous, sperm, milk and colostrum, tears, wax, caseosa (until first bath)), trans/exudate (namely pleural fluid, cerebrospinal fluid, ascites fluid, synovial fluid, amniotic fluid, pus, sweat), and any biological samples taken from the body (including tissue sample, placenta, cytological sample, organ, bone marrow).

**Body fluid exposure:** Accidental exposure to body fluids that may lead to contamination of healthcare workers or the environment.

**Bundles:** A structured way of improving the processes of care and patient outcomes: a small, straightforward set of evidence-based practices (generally three to five) that, when performed collectively and reliably, have been proven to improve patient outcomes.

**Carrier:** A person or animal that harbours a specific infectious agent without definite clinical disease and serves as a potential source of infection. The carrier state may exist in an individual with an infection that is inapparent throughout its course (asymptomatic carrier), or during the incubation period, convalescence and postconvalescence of an individual with a clinically recognizable disease (convalescent carrier). Under either circumstance the carrier state may be of short or long duration (temporary or transient carrier, or chronic carrier).

**Cleaning:** The physical removal of soiling/contamination, such as organic matter, from surfaces or objects and making them safe for use

**Cohort:** Grouping people together.

**Colonisation:** Colonization is the presence of microorganisms on or inside of the host without clinical signs or symptoms of infection or immune response. No antimicrobial therapy is required.

**Contamination***:* The presence of an infectious agent on a living or non-living surface, often invisible to the naked eye.

**Communicability:** is the time taken from when a person is exposed to a source (usually another person) who is harbouring the infecting agent, to be able to transmit the pathogen. It differs from the incubation period and depends on the mode of transmission, such as the respiratory, gastrointestinal tract or the skin.

**Deep cleaning:** Deep cleaning (often referred to as spring cleaning) involves cleaning walls, ventilation shafts and storage areas, floors, windows, ceilings, etc in all clinical and non-clinical areas. In some situations, temporary closure of such areas is required whilst deep cleaning is taking place. In clinical areas, medical equipment has been appropriately moved and or disconnected.

**Detergent** (containing surfactant): Compounds that possess a cleaning action. They are composed of a hydrophilic and a lipophilic part and can be divided into four groups: anionic, cationic, amphoteric, and non-ionic. Although products used for handwashing in healthcare may contain various types of detergents, the term “soap” will be used to refer to such detergents in these guidelines.

**Dermatitis:** This is a general term used to describe inflammation of the skin characterised by redness, itchiness, dryness and swelling.

**Disease:** A clinical manifestation of an infection or syndrome relating to an infectious agent.

**Disinfection:** Process of removing microorganisms (except spores).

**Disinfectant**: Antimicrobial agents that are applied to non-living objects to destroy micro-organisms, excluding spores. They are used on inanimate objects (furniture and the environment) and surfaces because they have adverse effects on living tissue.

**Efficacy/ efficacious:** The (possible) effect of the application of a chemical such as HH formulation when tested in laboratory or in vivo situations.

**Effectiveness:** The clinical conditions under which a HH product has been tested for its potential to reduce the spread of pathogens, e.g., in field trials.

**Emergency Medical Services (EMS):** An organisation or body that is dedicated, staffed and equipped to operate an ambulance, medical rescue vehicle or medical response vehicle to offer emergency care.

**Endogenous flora:** Bacteria which reside within the human body.

**Exogenous flora:** Bacteria which do not reside within the body and are usually found in the environment or have been introduced by other means such as hands or medical devices.
**Fomites**: Any articles which have been in contact with a patient that may transmit infectious microorganisms.

**Hand hygiene:** A general term referring to any action of hand cleansing. Hand rubbing with an alcohol-based handrub or handwashing with soap and water aimed at reducing or inhibiting the growth of micro-organisms on hands.

**Hand washing**: Refers to the action of washing hands with plain (non-antimicrobial) soap and water. Hands must be dried thoroughly after washing.

**Healthcare-associated infections (HAIs):** Infections that occur as a result of receiving healthcare, whether in a hospital or an out-of-hospital setting and not present or incubating at the time of admission. Generally, they do not manifest before the first 48 hours after contact with healthcare services. Some surgical site infections may only occur after discharge, 30 to 90 days post-operatively depending on the type of surgery. Occupational-related infection and iatrogenic infections are also classified as HAIs.

**Healthcare area (zone):** Refers to all regions outside of the patient zone. The healthcare zone is also referred to as the “patient surroundings”, i.e., other patients and their patient zones and the wider healthcare environment. This includes the curtains, partitions and doors between separate patient areas. The healthcare zone can include shared patient areas. Organisms found within the healthcare zone are foreign to the patients and potentially harmful to all patients. For EMS, the healthcare area could include the front cab of the ambulance, including door handles, any clean or sterile supplies located in the ambulance compartments, including PPE, clean linen, the EMS bag and portable oxygen bag, portable radios and crew phones.

**Healthcare facility:** The whole, or part, of a public or private health institution, facility, building or place, whether for profit or not, that is operated or designed to provide treatment; diagnostic or therapeutic interventions, nursing, rehabilitative, palliative, convalescent, preventative or other health services such as emergency medical services (EMS)

**Healthcare general waste:** The non-hazardous components of waste generated by a generator and can include liquids but excludes healthcare risk waste; and healthcare waste generated from isolation wards.

**Healthcare risk waste:** The hazardous portion of waste (solid and liquid) generated in a health establishment, that includes waste generated from the treatment, prevention and diagnosis of disease in humans, infectious waste, infectious sharps and pharmaceutical waste (expired, unused, spilt or contaminated drugs, medicines and vaccines, including packaging materials).

**Healthcare waste:** Waste generated at a health facility and includes both healthcare general waste and healthcare risk waste.

**Healthcare worker:** Any person who delivers healthcare and services (directly or indirectly) in a health facility to users. It includes healthcare professionals and support staff (cleaners, food service workers, laundry staff, administrative staff etc.).

**High touch services:** Frequently touched surfaces.
**High risk settings:** Operating theatre, Neonatal unit, Intensive care units, Maternity units, Dialysis Units.

**Incubation period:** this is the time taken from when the infecting agent enters the human body and clinical disease occurs. This may vary according to the immune competency of the person exposed but the time shown below is an average.

**Infection prevention and control:** Is a scientific evidence-based approach and practical solution designed to prevent harm caused by infection to patients and health workers. It is grounded in infectious diseases, epidemiology, social science and health system strengthening.

**Infection control bundles:** A set of evidence-based practices (generally three to five) that have
been proven to improve patient outcomes when performed consistently all the time.

**Infectious linen:** Linen used in the care of patients with communicable disease or colonised/ infected with multidrug-resistant organisms (patients nursed with isolation precautions).

**Infested linen:** Linen used on patients with parasites like scabies, lice, fleas and bedbugs.

**Infection prevention and control (IPC) practitioner:** Healthcare worker that has a qualification equivalent to the minimum of Fundamental or Post graduate diploma/degree in IPC.

**Isolation:** patient placement to reduce transmission – usually requires a single room or may be a cohort or several similarly infected patients in one ward or area; transmission-based precautions are essential.

**Low touch surfaces:** Areas that are touched less often.

**Medical surveillance:** Is a planned programme or periodic examination (which may include clinical examinations, biological monitoring or medical tests) of employees by an occupational health practitioner or, in prescribed cases, by an occupational medicine practitioner.

**Minimum requirements:** IPC standards that should be in place at the national and facility level to provide minimum protection and safety to patients, healthcare workers and visitors, based on the WHO core components for IPC programmes.

**Multidrug resistant Organisms**: Micro-organisms demonstrating antimicrobial resistance to at least one antimicrobial drug in three or more antimicrobial categories.

**Multimodal improvement strategies:** Comprises of several elements or components (three or more; usually five) implemented in an integrated way with the aim of improving an outcome and changing behaviour. It includes tools, such as bundles and checklists, developed by multidisciplinary teams that consider local conditions. WHO identified five components: (i)system change (availability of the appropriate infrastructure and supplies to enable IPC good practices); (ii) education and training of healthcare workers and key players (for example, managers); (iii) monitoring infrastructures, practices, processes, outcomes and providing data feedback; (iv) reminders in the workplace/communications; and (v) culture change within the health facility or the strengthening of a safety climate.

**Negative Pressure Ventilation:** Negative pressure is used in areas where it is essential to prevent the escape of contaminated air from an isolation room through the door or other gaps towards other patient areas. It is created by extracting more air from a room than is supplied to the room so that the infectious droplet nuclei are contained within a room by a continuous air current being pulled into the room under the door. The air in the room is kept at negative pressure compared to the other areas and the air must be safely removed from the room to the outside.

**Patient:** Refers to a person receiving or registered to receive medical treatment.

**Patient safety:** The reduction of risk of unnecessary harm associated with healthcare to an acceptable minimum.

**Patient zone:** Includes the patient and the patient's immediate surroundings. The patient zone is the area that is temporarily and exclusively dedicated to an individual patient for their care. This typically includes the patient and all inanimate surfaces that are touched by or in direct physical contact with the patient such as the bed rails, bedside table, bed linen, infusion tubing and other medical equipment. It further contains surfaces frequently touched by health workers while caring for the patient, such as monitors, knobs and buttons, and other touch surfaces. Since the patient's flora rapidly contaminates the entire patient zone, it should be thoroughly cleaned after one patient leaves, before the next patient arrives. Within the patient zone there

are two critical sets of sites, a) clean sites (e.g., intravenous/ IV access point) that need to be protected against microorganisms, and b) body fluid sites (e.g., indwelling urinary catheter) that may lead to body fluid exposure. Point-of-care products should be accessible without having to leave the patient zone. For emergency medical service (EMS) the patient zone (in an ambulance) is the entire area where the patient is housed and transported including the stretcher with a patient on it, linen, patient care equipment including monitor patient belongings, paper/electronic patient care report and transfer documents, contact surfaces in the ambulance during patient transport, and door internal handles.

**Persistent activity**: The prolonged or extended antimicrobial activity that prevents the growth or survival of microorganisms after application of a chemical such as antiseptic. Also called “residual”, “sustained” or “remnant” activity. Both substantive and non-substantive active ingredients can show a persistent effect significantly inhibiting the growth of microorganisms after application.

**Plain soap:** Detergents that contain no added antimicrobial agents or contain antimicrobial agents solely as preservatives.

**Point of care:** The place where three elements come together: the patient, the health worker and care or treatment involving contact with the patient or his/her surroundings (within the patient zone).

**Procedure:** An act of care for a patient where there is a risk of direct introduction of a pathogen into the patient’s body.

**Positive pressure ventilation:** The air in the room is leaked out through the doors, windows or other openings. This allows airborne microorganisms that may infect the patient to be kept away from the patient, an example of its use is in operating theatres.

**Single-use devices:** “Single use” in terms of a medical device means one use of a medical device on an individual or one use of an in vitro diagnostic medical device (IVD) on a sample during a single procedure and then the medical device or IVD is disposed of and is not reprocessed and not used again.
**Soiled linen:** Linen that is visibly soiled with blood, other body fluids, and/or faecal matter.

**Soiling:** The visible presence of dirt or offensive matter on a living or non-living surface that should be clean.

**Terminal disinfection:** The process of rendering a patient’s room free from the possibility of transmitting infection after a patient has left the room.

**Used linen:** Linen that has been used in patient care but is not visibly soiled.

**Visibly soiled hands:** Hands on which dirt or body fluids are visible.

# Chapter 1

## 1.1 Background on Infection, Prevention and Control

Infection prevention and control (IPC) is a practical, evidence-based approach preventing patients and health workers from being harmed by avoidable infections (WHO).

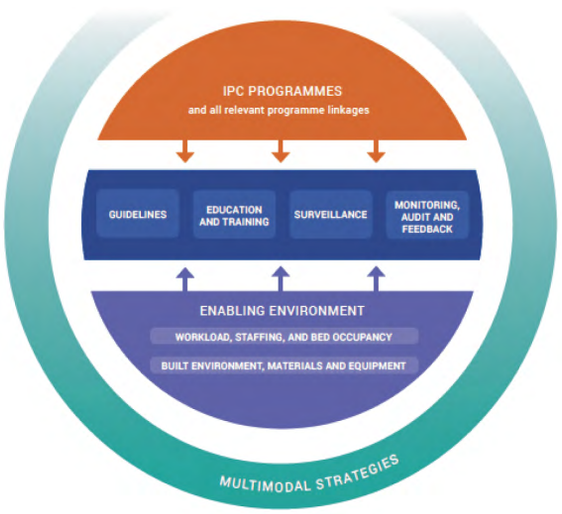
Infection prevention and control uses a risk management approach to minimize or prevent the transmission of infection. The two-tiered approach of standard and transmission-based precautions provides a high level of protection to patients, healthcare workers and other people in healthcare settings.

**Standard precautions** are the minimum infection prevention and control practices that must be always used for all patients in all situations. **Transmission-based precautions** are used when standard precautions alone are not sufficient to prevent the spread of an infectious agent. They are based upon the mode of transmission of the infectious agent.

Basing on scientific evidence, expert consensus and country experiences, the WHO core components for infection prevention and control (IPC) are the foundation for establishing or strengthening effective programmes at the national and facility level (WHO Core Component Guidelines 2016).

WHO recommends that effective IPC program in health care setting should focus on the eight core components.

**Figure 1: The Eight Core Components of an IPC programme**

| Figure 1 visual of the 8 Core Components | Figure 1: The Eight Core Components |
|---|---|
|  | • Core component 1: IPC programmes (and all relevant programme linkages)<br>• Core component 2: IPC guidelines<br>• Core component 3: IPC education and training<br>• Core component 4: Surveillance<br>• Core component 5: Multimodal strategies<br>• Core component 6: Monitoring/audit of IPC practices and feedback<br>• Core component 7: Workload, staffing and bed occupancy.<br>• Core component 8: Built environment, materials and equipment for IPC at the facility level |

Infection Prevention and control (IPC) is globally recognized as a critical component of a comprehensive approach to safety of patients, healthcare providers and their communities. The role of IPC in prevention of hospital acquired infections (HAIs) and addressing the rising concern of Antimicrobial Resistance (AMR) is increasingly recognized in many global and national health efforts as reflected in the emerging priorities of the World Health Organization's Member States and their partners.

WHO estimates that out of 100 patients hospitalized, 7 will be infected with a HAI in high income countries: the risk doubling and being up to 20 times higher in low- and middle-income countries (WHO, 2022). The more severe the patient becomes, the higher the risk of acquiring HAIs and their deadly consequences. This may lead to two – three folds' increase in deaths when infections are resistant to antimicrobials. In Africa, it is estimated that the prevalence of HAIs is 12.76% with highest in ICUs (Abubaker et. al; 2022). However, there is limited data about the burden of HAIs in Africa due to under reporting, inadequate research, and IPC related studies. Even though improving IPC programming and practice is a proven approach to curbing down HAIs and AMR, South Sudan's IPC practice is currently fragmented and has been outbreak centred.

### 1.2 Rationale for prevention of HAIs and outbreaks

There is a consensus among healthcare practitioners that transmission of infective agents can occur from Health Care Workers (HCWs) to patients, from patients to HCWs, from patient to patient, or from HCW to HCW. No country or health system even in the most developed or sophisticated can claim to be free of HAIs and AMR; however, the risk of infection transmission is higher if basic IPC practices are not observed. Infections that are associated with health care not only increase morbidity and mortality in patients, but are also responsible for prolonged hospital stays, long-term disabilities, and increased resistance of microorganisms to antimicrobials which further strains the already fragile healthcare systems.

In efforts to combat AMR, the country is developing the AMR National Action Plan (NAP) 2023-2028. The NAP AMR addresses 5 priority objectives which are, (i) improve awareness and understanding of antimicrobial resistance, (ii) strengthen knowledge through surveillance and research, (iii) reduce the incidence of infection (iv) optimize the use of antimicrobial agents, and (v) develop an economic case for sustainable investment in countering AMR. As IPC plays a critical role in the reduction of HAIs and combating AMR, it is therefore important for the IPC Guidelines to also align with the strategies that have been outlined in the Draft NAP AMR 2023-2028. This can be achieved through implementing and adherence to evidenced based IPC protocols that are outlined in the IPC Guidelines.

### 1.3 Application of IPC Program in prevention HAIs Outbreaks (IPC core components)

Health care-associated infections (HAI) are one of the most common adverse events associated with health care and a major public health problem. HAIs are infections that were not present or incubating at the time of admission. They are responsible for significant morbidity and mortality impacting the quality of life of patients and can lead to prolonged hospital stay, increasing the economic burden to individuals and health systems.

A large proportion of HAI are preventable through the implementation of proven IPC strategies. IPC is concerned with patient and healthcare worker safety and is a part of a multidisciplinary approach to strengthening the healthcare system and preventing HAI.

In Africa, the impact of HAIs is not well understood or documented in most cases, however available data suggests a high burden compared with other parts of the world. In South Sudan HAIs have not been systematically tracked or studied. However, there is a consensus, informed by the 2019 COVID 19 Pandemic, and the growing threat of AMR that HAIs endanger patient and healthcare worker safety and need to be the subject of surveillance, investigation, and improvement action. Assessments have taken place throughout the facilities with overall results of partial compliance presented. There is much to be learned from these results, for example hand hygiene, isolation practices, etc.

In the last few years, South Sudan has been battling with Hepatitis E and acute watery diarrhea (AWD); the country has also suffered many cholera outbreaks, In June 2016 to February 2018, there was a Cholera outbreak lasting almost 2 years with a total number of cases reaching 20,438 with 436 deaths and a case fatality ratio of 2.13%. A massive response was launched and in the following rainy season, focus shifted to prevention. No confirmed cholera case was recorded since the 2018 rainy season (between April and November) through April 2021. However, Acute Watery Diarrhoea continues to be of great concern according to weekly surveillance data.

The Ministry of Health declared another outbreak of cholera on the 14th of April 2022 in Bentiu, Rubkona, Unity State. As of 28th September 2022, a total of 424 cholera cases were reported including 01 death (case fatality rate = 0.2%).

In 2023, South Sudan declared a cholera outbreak in Malakal County, Upper Nile state on 7 March 2023 after 2 cases tested positive for vibrio cholerae using polymerase chain reaction (PCR). As of week 18, of 2023, a total of 1387 cholera cases have been line listed with two deaths (Case fatality rate of 0.15%).

A comprehensive IPC system with national evidence-based and regularly updated IPC guidelines and strategies is therefore critical to ensure IPC practices and procedures are implemented and adhered to with the aim of reducing HAIs including future outbreaks, combatting AMR and achieving optimal health outcome.

### 1.4 The purpose of the National IPC Guidelines

To provide guidance on IPC implementation and improve IPC practices in South Sudan.

### 1.5 Specific Objectives

1. To Standardize IPC practices across the country
2. To prevent disease transmission to patients, healthcare givers and the community
3. To promote healthcare worker protection
4. To specify the roles and responsibilities of stakeholders for IPC implementation
5. To strengthen IPC practices at community level

### 1.6 Target Audience

These guidelines are intended for use by stakeholders at all levels of healthcare service delivery in South Sudan.

The guidelines are mainly recommended for the following.

- Health care workers and trainers in all public and private health facilities including pharmacies, including Professional Associations and Regulatory Councils/Boards.
- Implementing partners, research organizations that are providing health care services.
- Policymakers, health managers and administrators as well as program officers.

- Community health workers, volunteers, patients and their caregivers at all levels.
- In addition, these guidelines provide a framework to implement IPC in the community.

### 1.7 How to use these Guidelines?

These guidelines outline the nationally approved evidence-based IPC practices to guide implementation of IPC programs, infrastructure, and culture necessary for health care workers, patients, caregivers / visitors, and the entire community.

These guidelines shall be updated every five years. The guidelines are organized into chapters with brief introductions followed by various subsections that clearly outline details of the evidence-based IPC practices and technologies. At the end of the guidelines, there is a list of key reference materials provided for further reading and contextualization. Additionally, the IPC related materials have been included in the appendices.

# Chapter 2

## 2.1 The WHO Core Components

Effective and sustainable IPC programmes can positively influence the quality of care, improve patient safety, and protect those providing and receiving care in HCFs. The implementation of all the WHO recommendations on Core Components is required to build functional programmes that lead to the reduction of HAIs and antimicrobial resistance (AMR). The Minimum Requirements are those IPC standards that should be in place at national and facility level to provide minimum protection and safety to patients, caregivers, health workers and visitors, and is based on the WHO Core Components for IPC programmes.

The Core Components consist of the following elements:

- Core Component 1: IPC programme
- Core Component 2: IPC guidelines
- Core Component 3: IPC education and training
- Core Component 4: Surveillance of healthcare-associated infections
- Core Component 5: Multimodal strategies for implementing IPC activities.
- Core Component 6: Monitoring, Evaluation and Feedback
- Core Component 7: Workload, staffing and bed occupancy at facility level.
- Core Component 8: Built environment, materials, and equipment for IPC at facility level.

## 2.2 WHO Core Components of an IPC Program

The Minimum Requirements represent the starting point to build a strong and effective IPC programme at national and facility level and SHOULD be in place at all HCFs to result in full implementation of all Core Components. Implementing the WHO Core Components should be done using Multimodal Improvement Strategies

Each of the elements of the Core Components will be discussed in detail in different chapters in the guideline.

## 2.3 IPC programme

Implementing an effective IPC programme has proven to be a cost-effective measure to reduce morbidity and mortality due to HAIs. Exiting literature demonstrates that a 6% reduction in HAIs could pay for an entire IPC programme. Other benefits to investing in a strong IPC programme is setting aside funds which can be allocated to other IPC priorities.

It is important that a National IPC programme should have clearly defined objectives, functions and activities with the main purpose to prevent HAI and prevent antimicrobial resistance (AMR) through evidence-based IPC best practices. There should be a dedicated, full time focal person responsible for the development and implementation of the IPC programme and supported by a dedicated budget.

A strong commitment from management is essential towards establishing a robust IPC programme. The implementation of the National IPC Guidelines will be supported by the National IPC Strategic Plan of 2022-2026.

## 2.4 Resources

A robust and sustainable IPC programme requires a knowledgeable and trained IPC workforce that understands both the clinical and cultural aspects of the communities it serves. It is further important that a dedicated budget is allocated to the implementation of the IPC programme.

## 2.5 IPC staffing resources

Health workers delivering IPC programmes should be dedicated to IPC, with a clear job description and managerial support which allows them to function effectively. There should be at least one formally trained IPC clinical practitioner at every County hospital or for every 200-250 acute beds per facility (see Chapter 12 on IPC Training). Where IPC practitioners have more than one role such as Occupational Health and/or Quality Assurance, a dedicated number of hours per week must be assigned to IPC to complete the necessary tasks as defined by the IPC committee. There should be IPC focal persons at each facility; PHCU, PHCC, County Hospitals, State Hospitals and National/referral Hospitals and private/Faith-based health facilities who works closely with the IPC practitioner/ focal person at various levels such as Boma, Payam, County, State and the National level. The IPC focal persons at the Boma, Payam, County, State and the National levels should be adequately trained to ensure the provision of adequate technical support to the facility-based IPC Focal Persons. Each healthcare facility should have IPC link persons with a functional reporting line to the IPC practitioner. Link persons should assist with the implementation of the IPC programme at facility level and should have time allocated for IPC activities.

There should be a functioning IPC Committee that coordinates and monitors IPC activities as set out by the committee.

## 2.6 Management Support

Ensuring a robust IPC programme is a key priority in the management's strategic approach to delivering quality healthcare. This is achieved by designating focal persons at all levels to promote IPC awareness and ensure accountability throughout the entire health system. It is essential for management to have a visible presence and actively participate in IPC Committee meetings, demonstrating their commitment to IPC efforts. Furthermore, management must provide support and actively contribute to the development, review, and implementation of policies, guidelines, and procedures related to IPC.

## 2.7 IPC budget

A dedicated IPC budget should be made available for:

- Regular and structured accredited IPC training.
- Consistent supplies for IPC such as PPE, medical devices and infrastructure provision. Conducting regular surveillance, especially in high care units.
- Investigate outbreaks and clusters of infections in healthcare.
- Monitoring and Evaluation (M&E).

## 2.8 Coordination structure for IPC at all Levels from National to Sub National

The structure of the IPC programme is in accordance with international guidelines (WHO Core Components) and has been outlined, from the Director General of Preventive Health Services down to IPC Link Person (at the Boma level) **See Appendix 1** National IPC Structure and Terms of Reference of various Committees at National and HCF Level

**The Purpose:**

The National Infection Prevention and Control Committee (NIPCC) through the Director General Preventive Health Services will support, strengthen, and provide over-sight to the Ministry of Health Infection Prevention and Control (IPC) programmes and advise the Under Secretary on priority areas for the reduction of Healthcare Associated Infections

**Membership:**

The NIPCC will comprise of inter-departmental members in the MoH and Intersectoral members with relevant diverse skills nominated by the Ministry and will include representatives of stakeholders, donors, and health profession training institutions.

**Chair:**

The NIPCC will be chaired by the Director General Preventive Health Services in the MoH. The Members will be appointed by the Under Secretary.

**Role of the Chairperson:**

- Chairing meetings
- Communicating with all NIPCC members
- Directing and ensuring that the NIPCC functions with good governance
- Making sure each meeting is planned efficiently and conducted according to the TOR.

**The Secretariate:** The National IPC/WASH Focal Person

**Role of the Secretariate:**

- Organising meetings
- Taking minutes
- Reminding NIPCC members to address the action points or their tasks

**Composition of the National Infection Prevention and Control Committee:**

Members of the NIPCC are a team of experts in the field of IPC/WASH appointed by the MoH & may include but are not restricted to representatives from:

- Relevant departments in the MoH (Nursing, Reproductive Health, Pharmacy, Environmental Health, AIDS + TB Unit, Primary Health care department)
- Representative of State Medical Directors.
- Representatives from Academic Institutions e.g., Medical Schools
- WHO and CDC and Representatives of health implementing partner.
- Ministry of Housing, Physical Planning and Development
- Environmental Management Agency (EMA).
- Ministry of irrigation and water Resources Environment and Forestry

- Other stakeholders co-opted from time to time, interested in IPC and quality health improvement.

**Roles and Responsibilities:**

- Identify priority areas of operational research in relation to HAI Surveillance control and IPC implementation.
- Provide expertise and support in relation to IPC in the MOH antibiotic resistance strategy.
- Provide guidance in evidence-based policy formulation and reviews.
- Identify training needs in Infection Prevention and Control.
- Advocate for benchmarking of national standards in IPC in accordance with regional and international best practice.
- Provide strategic direction in Leadership and Governance in IPC matters.
- Mobilise ressources and ensure effective utilisation.
- Design strategies for sustainability of IPC programmes countrywide.
- Lobby for a Career Structure and specialisation in IPC.
- Articulate M&E indicators that monitor, report and tract incidence or prevalence of HAIs.
- Advise on infrastructure in relation to IPC – work with Hospital Planning and Infrastructure.
- Disseminate reports to MoH departments and stakeholders.
- Establish Technical Working Groups in IPC Training, M&E and Surveillance and Infrastructure.
- Monitor performance of TWGs.

**Sub-Committees/ Technical Working Groups (TWG)**

- Training Technical Working Group
- Infrastructure Technical Working Group
- Surveillance of HAIs including TBIC and M&E Technical Working Group

**Terms of Reference** for the TWGs will be discussed by the respective committees in consultation with the MoH

**Frequency of Meetings:** Quarterly

**IPC Committee**

An IPC Committee should be established for each HCF with clear terms of reference and representatives from the essential clinical and support services. It is a decision-making body with financial and administrative powers. At health centre, clinic and community level, the Primary Health Care (PHC) Supervisor will coordinate IPC activities and forms part of the IPC Committee.

The representation should be from the following disciplines, but other members can be co-opted as needed:

- Administration preferably the Director General (at National and Intermediate hospitals) and Senior Medical Officer (at County hospital) to chair the IPC Committee
- IPC nurse practitioners
- Pharmacist

- Environmental Health practitioners
- Engineering/ technologist for the hospital
- Clinical equipment manager
- Sterile services manager or deputy
- Hospital matron/Nurse in charge // PHC supervisors
- Microbiologist or Laboratory technicians
- Administrative control officers
- Support services (cleaning, catering, laundry, and maintenance)
- Clinical specialist representative from acute services
- Other members can be co-opted.

**Functions of the IPC Committee**

There must be monthly meetings which make at least one decision at each sitting of the IPC Committee to ensure that the IPC programme moves forward and that all challenges are addressed. Minutes of each meeting must be in writing and available for the Monitoring and Evaluation (M&E) teams to inspect if required. The matters which are addressed by the IPC Committee are widespread, but essentially the following are included:

- Surveillance
- Outbreak investigation and reporting
- Risk Management
- Quality Improvement
- Education and Training of health care workers
- Monitoring and Evaluation (including audits)
- Recording and Analysis
- Antimicrobial Stewardship. Most facilities have an additional Antimicrobial Stewardship Committee.

The functions of the IPC committee are detailed in **Appendix 1**.

# Chapter 3: Standard Precautions

Standard Precautions represent the minimum infection prevention measures that always apply to all patient care, regardless of suspected or confirmed infection status of the patient, in any setting where healthcare is delivered. These evidence-based practices are designed to protect HCWs and prevent the spread of infections among patients. Standard Precautions are based on the principle that all blood, body fluids, secretions, excretions (except sweat), non-intact skin, and mucous membranes may contain transmissible infectious agents. In addition to the consistent use of Standard Precautions, additional precautions may be warranted in certain situation. These additional Transmission-based precautions may be needed and should be strictly adhered to when the route of transmission is not completely interrupted using Standard Precautions alone.

**Standard precautions include:**

1. Hand Hygiene
2. Personal Protective Equipment
3. Environmental cleaning
4. Safe handling of linen and laundry
5. Respiratory hygiene and cough etiquette
6. Prevention of sharps injuries
7. Healthcare waste management
8. Cleaning, disinfection, and sterilization of patient care articles

Policies and Standard operating procedures covering all these areas always need to be implemented to minimize the risk of transmission of infection from an unrecognized source be it an individual, contaminated equipment, linen or waste. Every person working within a healthcare facility should familiarize themselves with all standard precautions and ensure they are always compliant.

## *3.1 Hand Hygiene*

Hands are the main route of transmission in healthcare facilities. The transmission of HAI pathogens occurs via direct contact between staff and patients. Effective hand hygiene (HH) is a critical component of Standard Precautions (SP) and ensures patient and staff safety. it is the simplest, and most cost-effective measure to reduce HAIs.

Commitment and support from management at all levels are critical in the successful and sustainable implementation of HH strategies. The implementation of multimodal implementation strategies is the most effective approach to improve HH compliance.

***Key practice points***

- Perform hand hygiene action at the right time and in the right way to stop the spread of infection.
- Apply the WHO *Your 5 Moments for Hand Hygiene* to clean hands at the right time.
- Perform the right technique, including the time it takes to perform hand hygiene.
- Use alcohol-based hand rub (gold standard) or wash with soap and water (and drying afterwards).
- Apply recommended modifications to achieve hand hygiene action, until the correct standard of infrastructure is in place in resource constrained situations.

- Focus on a combination of a supportive infrastructure, the use of reminders (e.g., posters), training and education (consistent with guideline content and relevant to the local clinical workflow to resonate clinicians), monitoring and evaluation (using a valid and reliable approach) and a safety culture, to make it more likely that hand hygiene will be performed in the right way at the right time.
- Use valid and reliable tools for improving hand hygiene (see resource links)

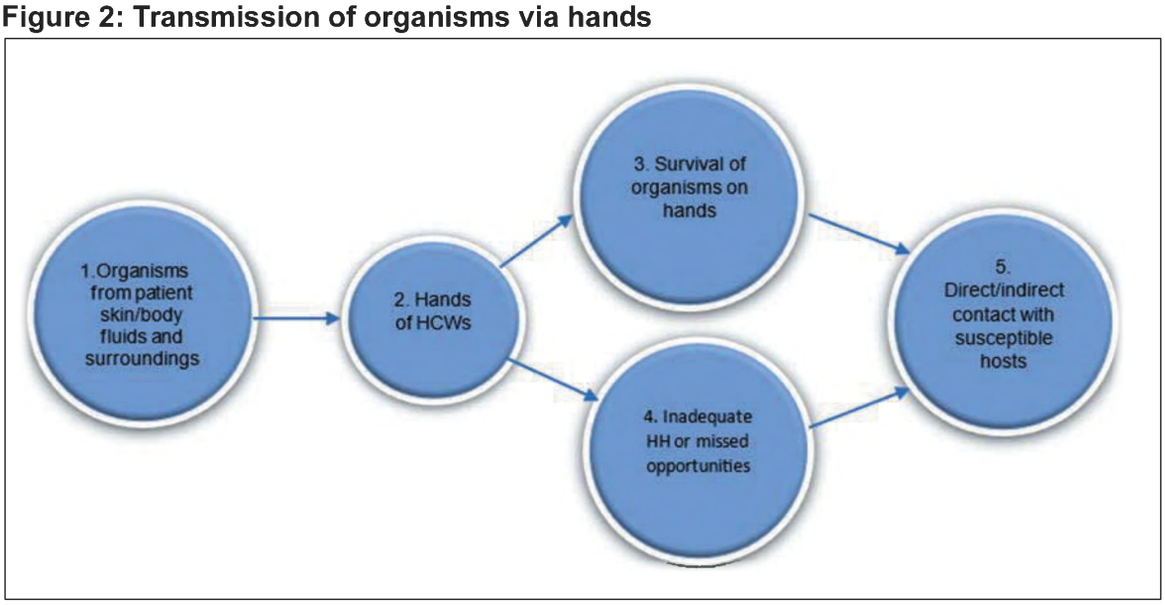
Promote hand hygiene as the "entrance door" to broader safety and quality improvement. IPC interventions require the consistent practice of preventive procedures, such as hand hygiene.

**Why is hand hygiene important?**

Transmission can occur either by direct contact with the patient, or indirectly via contact with medical devices or patient surroundings. This occurs in five sequential steps (**Figure 2**):

- Organisms are present on the patient's skin or in blood and body fluids or
- Have been transferred onto the hands of the health workers; and
- Remain viable on the hands of the health workers; and
- With missed opportunities for hand hygiene, inadequate hand hygiene, and
- Then the contaminated hands of the caregiver come into direct contact with another patient (directly) or with an inanimate object that will come into direct contact with the patient (indirectly).

**Figure 2: Transmission of organisms via hands**




**Skin flora**

There are two different groups of micro-organisms on the skin.

**Transient skin flora is found on the upper layers (epidermis**) which are easily transmitted through physical contact between patients, health workers and the healthcare environment and has been implicated in HAI transmission. Transient flora can be easily removed by good HH practices.

**Resident flora live in the deeper skin layers (dermis)** and is part of normal flora. It is also more difficult to remove**.** They are less likely to cause infection.

**Barriers to hand hygiene**

When developing HH improvement strategies, the following possible barriers should be addressed:

- HH agents that cause skin irritation and dryness.
- The perception that patient activities take priority over HH especially when there is a heavy workload and understaffing.
- Lack of resources (water, soap and paper towel).
- Infrastructure limitations: Hand wash basins inconveniently located and/or not available.
- Alcohol-based hand rub (ABHR) not available at the point of care.
- Unavailability and inadequate knowledge of guidelines, protocols or technique for HH.
- Lack of positive role models and social norms.
- Lack of recognition of the risk of cross-transmission of pathogens.
- Simple forgetfulness and lack of attention to detail (many wash hands but not adequately)

**NEVER wash hands and immediately apply ABHR to wet hands as this may damage the skin.**

**Use of gloves**

**Gloves should never be used as a substitute for HH.** Very small perforations may be present in gloves prior to wearing them and these perforations increase with use. When contaminated, gloves can also transmit pathogens between patients or the environment and patients.

- HH must be performed before and after the use of gloves.
- Failure to remove gloves and perform hand hygiene after use constitutes non-compliance with HH.
- Alcohol should never be applied directly onto gloves as it will damage them.
- Hands must be thoroughly dried before donning gloves to reduce the risk of skin irritation.
- Always check gloves for damage before use.
- Ensure correct size of gloves.
- Ensure that the gloves being used are appropriate for the particular procedure.
- Discard after single use in the appropriate waste container

**Gloves are not a substitute for poor hand hygiene!**

**Dermatitis**

Health workers with contact dermatitis may remain colonised with potentially pathogenic microorganisms for prolonged periods of time. There are various reasons for dermatitis such as the following:

- Allergy to latex and related products.
- Frequent use of certain HH products such as soap.
- Application of ABHR to wet hands.
- Donning of gloves while hands are still wet from either washing or ABHR.
- Use of powdered gloves concurrently with alcohol-based products.
- Use of products not tested for tolerance or sensitivity.

**Recommendations for the protecting hands of health workers**

- All cuts and abrasions must be covered with a waterproof dressing.
- ABHR should contain emollients that assist with maintaining skin integrity, and when applied regularly, will protect hands from dryness.
- Avoid communal jars of hand cream as the contents become a source of cross-contamination.
- Provide alternate HH products for health workers with confirmed allergies.

**It is not recommended that hands are routinely washed with an antimicrobial soap.**

**Best Practice for Hand Hygiene**

Important points:

**Nails:**

- Nails should be kept short and clean and not show past the end of the finger.
- Long nails can pierce gloves.
- Nail polish should not be allowed as organisms can survive under the nail polish and in the nail bed and cuticle.
- **No acrylic nails, artificial nail or nail enhancements to be worn**.

**Jewellery:**

- The wearing of rings or other jewellery when delivering health care is strongly discouraged.
- For religious or cultural reasons, the wearing of a simple wedding ring (band) during routine care may be acceptable.
- All rings or other jewellery should be removed in high-risk settings.

**Consumables and equipment required for hand hygiene**

The essential infrastructure for hand hygiene is a hand wash basin with clean running water and a constant supply of paper towels, liquid soap and ABHR.

**Hand washing**

Hand washing is the act of cleaning one's hands with soap and water to remove micro-organisms, dirt, grease, or other substances from hands. Drying of the washed hands is part of the process as wet and moist hands are more easily re-contaminated. **Table 1** provides an overview of the infrastructure requirements for hand washing.

**Table 1: Infrastructure requirements for handwashing**

| | |
|---|---|
| **Handwash basins** | • Located at the entrance or exit of wards or clinical. areas, but **not in clinical areas next to the patient.**<br>• One hand washbasin for every six beds.<br>• Dedicated to hand washing only.<br>• Do not have any plugs to prevent soaking of medical devices.<br>• Deep enough bowl deep to prevent splashing and contamination of clothes.<br>• No overflow outlet.<br>• No recesses for water to collect.<br>• Waterproof splashback and properly sealed. |
| **Taps** | • Elbow operated mixer taps. |

| | |
|---|---|
| | • Taps should **not be aligned** to run directly into the drainage aperture to prevent splashback. |
| **Water** | • Clean, free running and at a comfortable temperature. |
| **Liquid soap** | • Available at each basin.<br>• Provided in a closed container that is either manually or elbow-operated with a pump action or an automated dispenser.<br>• Closed containers must have single use disposable sachets.<br>• Must have a surfactant to allow good lather.<br>• Hypo-allergenic and well tolerated.<br>• Never topped up. |
| **Paper Towel Dispensers** | • Wall mounted close to the hand wash basin and soap dispensers.<br>• No-touch paper roll dispenser for automatic dispensing is preferred, but single use pull-out paper towels are also acceptable.<br>• If single use pull-out paper towels are used, load the dispenser correctly to prevent contamination.<br>• Paper should have adequate strength to withstand contact with wet hands.<br>• **Warm air hand dryers are not recommended for health facilities**. |
| **Bins** | • Pedal operated to prevent contamination of hands.<br>• Emptied regularly (at least 3 times a day and twice during the night).<br>• Do not discard any biohazardous material in the bins. |

**Bottles for liquid soap**

- Liquid soap must be supplied in disposable 500ml pump top bottles.
- Bottles should never be topped up or liquid soap should not be decanted.
- However, if facilities are still using containers that have to be refilled, ensure that a heat stable product (which can withstand temperatures of 80˚C) is purchased to ensure that the bottles are thoroughly cleaned, and heat disinfected between each use (microwave or instrument washer-disinfector).
- Plungers/pump must be disposable since they are difficult to clean and disinfect.
- **Empty plastic bottles should not be re-used for liquid soap**.
- Any container that are used should be **labelled with the correct content** – the name on the bottle should reflect the content.
- Always write the date on a container when it is first used/opened.

See **Appendix 2** for the cleaning and heat disinfection of liquid soap containers.

**Note: Most disposable bottles and pump tops supplied by HH companies are not robust enough for reprocessing. Reprocessing of dispensing bottles is not recommended.**

**Note: Bottles should never be topped up with liquid soap.**

**Hand rubbing**

Alcohol based hand rub (ABHR) is the recommended product for hand hygiene and should be available at all points of care and points of public entrances. The concentration of alcohol varies between 75 – 80% depending on the type of alcohol used.

**Bottles for ABHR**

- ABHR bottles should be designed to minimise evaporation.
- Write the date on the bottle when it was first opened or placed in the dispenser to assist with monitoring of consumption.
- Sturdy disposable bottles (up to 500 ml) with pump-action tops are recommended.
- Long-nose pump action tops are recommended to avoid splashing.
- Sprays are not recommended due to the following:
- A single squirt spray may not yield a sufficient volume.
- Does not fit well in the elbow operated dispenser.
- Can cause respiratory irritation for the user.

**Brackets for ABHR**

- Medical grade stainless steel or epoxy-coated holders that are rust and corrosion resistant are recommended.
- Must be suitable in shape and design for the bottles used in the health facility.
- Have adjustable clamps to fit onto over-bed tables or brackets to fit onto wall, trolleys, or other fixed surfaces in the patient zone
- If a lever arm is necessary, the length of the lever arm must not obstruct workflow.

Different types of ABHR dispensers are described in **Table 2.**

**Table 2: Types of ABHR dispensers**

| Type of dispenser | Advantages | Disadvantages |
|---|---|---|
| **Automated Dispensers** | • Aesthetically pleasing<br>• Fast<br>• Non-touch<br>• Closed system that minimises contamination of the content | • Unusable when require replacement of batteries.<br>• Pre-Set amount of product<br>• Costs of maintenance and batteries<br>• Requires regular monitoring |
| **Manual Dispensers** | • Not dependent on batteries<br>• Wall or work surface mounted<br>• Closed system that minimises contamination of the content<br>• Robust to use | • Can be contaminated if incorrect technique is used |

**The dispenser must be placed at the point of care – within easy access to HCWs.**

**Amount of ABHR required per HH action.**

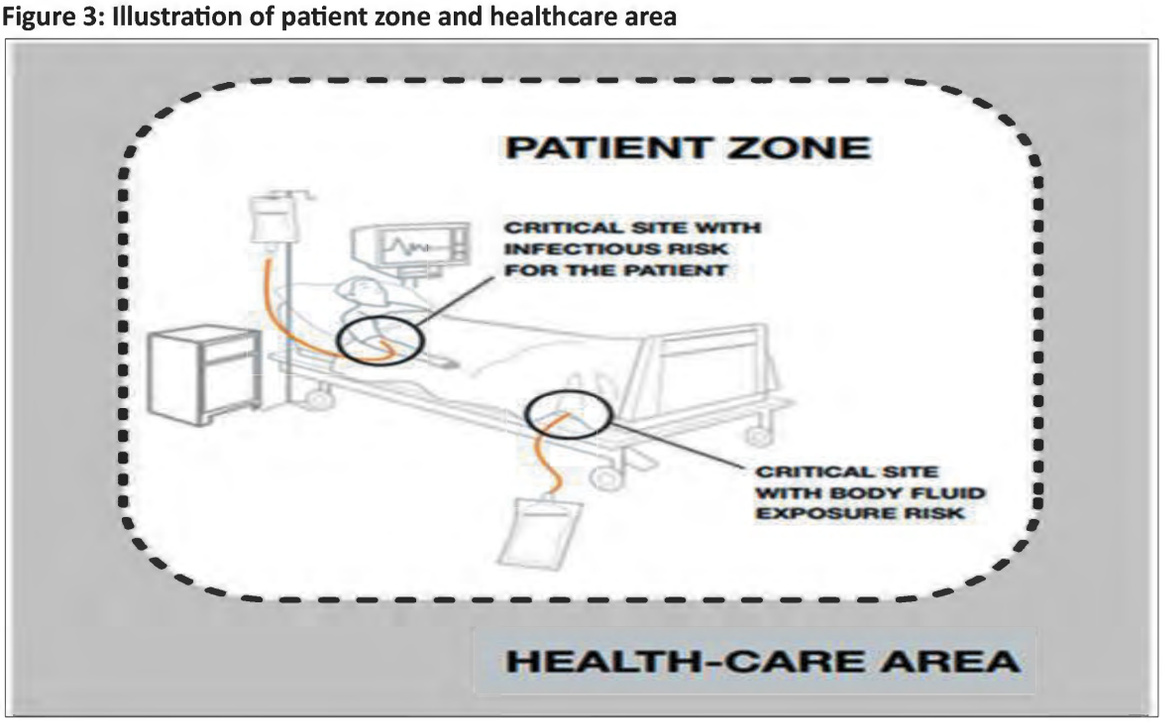
Size of hands differs and therefore the exact or pre-set amount of ABHR dispensed may be difficult to prescribe. The amount of ABHR should fill the palm of a cupped hand without spilling and this is approximately 2-3 ml (depending on hand size). Alternatively enough ABHR should be used to rub hands for 20 seconds.

Small pockets size containers filled with ABHR may be carried by health workers. This is acceptable practice since the hands will be disinfected prior to touching patients.

**Principles of Hand Hygiene**

The main purpose of hand hygiene is to reduce or destroy the number of potentially pathogenic microbes present on hands of health workers. The activity and associated risk of transferring microbes to or from a patient will dictate when hands need to be cleaned (5 Moments of HH). HH should be performed when entering or leaving the patient zone **(Figure 3)** and after any activity that may contaminate the hands and transfer microbes to the patient.

**Figure 3: Illustration of patient zone and healthcare area**




Understanding the critical moments **WHEN** HH should be performed and adhering to these moments is key to preventing transmission. The **"Five Moments for Hand Hygiene"** for when HH should be performed by health workers, and care givers of patients admitted to HCFs are illustrated in Figure 4. These 5 moments are applicable to both inpatient and outpatient settings. **Training should focus not only on technique, but also on the practical implementation of these 5 Moments** of HH.

**Figure 4: Moments of Hand Hygiene**

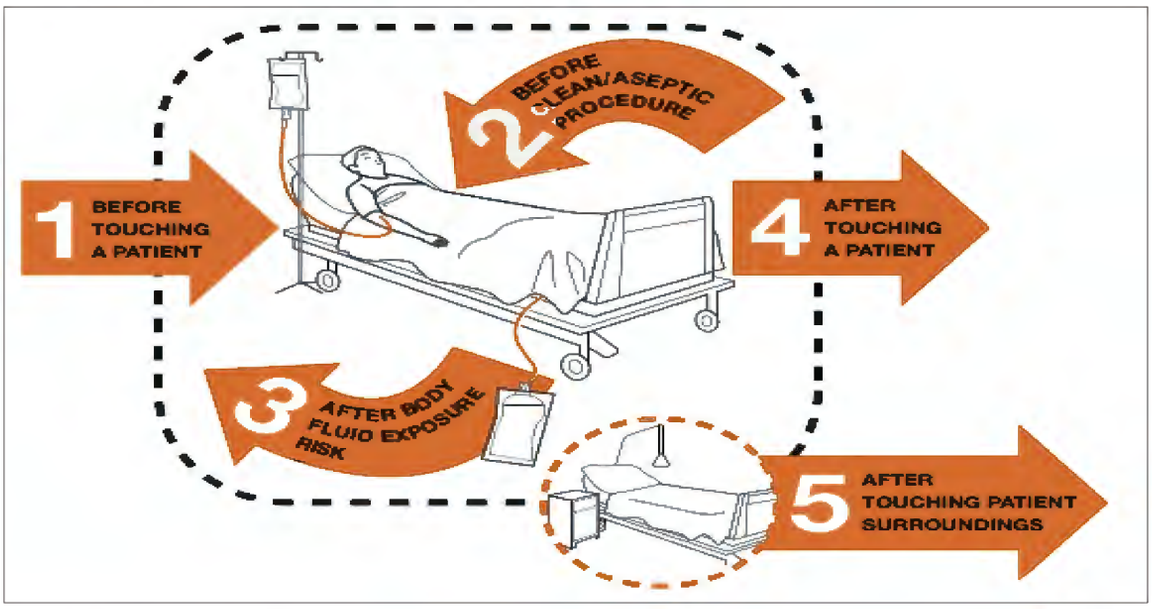



**Table 3** provides an explanation of the different moments of hand hygiene and the indications for each.

**Table 3: Indications for the 5 Moments of Hand Hygiene**

| 5 Moments of Hand hygiene | | Indication |
|---|---|---|
| **Moment 1** | **Before touching the patient** | Before and after touching the patient |
| **Moment 2** | **Before clean/aseptic procedure** | Before handling an invasive device for patient care, regardless of whether gloves are used.<br>If moving from a contaminated body site to another body site during care of the same patient. |
| **Moment 3** | **After body fluid exposure risk** | After contact with body fluids or excretions, mucous membrane, non-intact skin or wound dressing.<br>If moving from a contaminated body site to another body site during care of the same patient.<br>After removing sterile or non-sterile gloves. |
| **Moment 4** | **After touching the patient** | Before and after touching the patient.<br>After removing sterile or non-sterile gloves. |
| **Moment 5** | **After touching patient surroundings** | After contact with inanimate surfaces and objects (including medical equipment) in the immediate vicinity of the patient.<br>After removing sterile gloves or non-sterile gloves. |

**Note: There is often too much focus on the technique of hand hygiene (HOW) and not enough focus on the critical moments WHEN hand hygiene should be performed.**

**Application of the 5 Moments of Hand Hygiene**

**Moment One: Before touching a patient.**

**WHY:**

- To protect the patient against acquiring potential pathogens from the hands of the health workers. For example, shaking hands, physical examination, checking the patient's vital signs, personal care activities, before preparation and administration of oral medication, feeding.

**Moment Two: Immediately before carrying out a clean/aseptic procedure.**

**WHY:**

- To protect the patient from potential pathogens (including their own) from entering their body during a procedure. Examples are just before carrying out an invasive procedure such as insertion of an intravenous catheter, administration of parenteral medication, suctioning of a patient, performing wound care, and preparation of a sterile field.

**Note: Always perform hand hygiene before donning gloves and after doffing gloves.**

**Moment Three: After a body fluid exposure risk**

**WHY:**

- To protect yourself and the healthcare surroundings from transmission of potential pathogens from the patient such as after carrying out an invasive procedure, or any potential body fluid exposure.
- To prevent colonisation/infection in health workers, contamination of the healthcare environment, and transmission of microorganisms from a colonised site to a clean site on the patient.

**Moment Four: After touching a patient.**

**WHY:**

- To protect yourself and the health care surroundings from potential pathogens carried or shed by the patient. This indication is determined by the occurrence of the last contact with intact skin or the patient's clothing or a surface in the patient's zone, after direct patient contact.
- To prevent colonisation/infection in health workers and contamination of the health care environment.

**Moment Five: After touching a patient's surroundings.**

**WHY:**

- To protect yourself and the healthcare surroundings from potential pathogens from the patient's surroundings. Examples after touching the patient's immediate surroundings such as bed rails, curtains, monitor, over-bed table, bedside locker, call bell, table, clinical notes or surfaces, even if the patient has not been touched.
- To prevent colonisation/infection in health workers, and contamination of the healthcare environment. After touching the patient's environment, the health worker has micro- organisms on their hands; these microorganisms can be transmitted to the next patient/ surface the health worker touches. This includes after carrying out environmental cleaning.

**Types of hand hygiene methods**

**Table 4** summarises the methods of HH, the aim thereof, what products should be used and the main indications for each method. The three HH techniques are described in detail below, with the steps visualised in **Appendix 3 and 4**

It is important to ensure the following before hand hygiene is performed:

**Before performing hand hygiene:**

- Ensure availability of all necessary hand hygiene facilities and supplies before starting the process.
- Remove all rings, wrist jewellery and accessories (only plain wedding band allowed).
- Arms must be bare below the elbows, except when using PPE.

**Table 4: Summary of hand hygiene methods**

| Method | Aim | Products | Main Indicators |
|---|---|---|---|
| Hand Hygiene using<br><br>**Alcohol hand rub** | Destroy transient microbes | ABHR | • Before patient contact<br>• Before clean or aseptic technique<br>• After contact with the patient<br>• After contact with the environment<br>• Before wearing gloves<br>• After having removed gloves – if hands are not visibly soiled |
| HH using<br><br>**Soap and water**<br><br>Hygienic hand wash | Remove transient microbes | Wash with plain liquid soap and water and dry thoroughly with a paper towel | • When visibly soiled<br>• After personal hygiene processes<br>• After contact with blood or other body fluids |

| Method | Aim | Products | Main Indicators |
|---|---|---|---|
| | | | • Before and after wearing of gloves - if hands are visibly soiled<br>• Caring for patients with *C. difficile* |
| **Surgical hand preparation** | Destroy transient and reduce resident microbes on the skin for a prolonged period | • Surgical "scrub": Three-minute washing with antiseptic agents (4% chlorhexidine gluconate) before a theatre list<br>• No scrubbing with a nail brush<br>• Surgical hand rub:<br>• ABHR (70 -85.5% Ethyl alcohol) between theatre cases | • Hands must be washed at the start of the theatre list or between procedures when there was contact with blood or body fluid and hands are visibly soiled.<br>• Use ABHR between theatre cases when hands are not visibly soiled. |

**Alcohol hand rub technique**

**Using ABHR to perform HH is regarded as the gold standard.** When practiced correctly, it is highly effective in preventing transmission of microbes. It is more efficacious than soap and water as it rapidly and effectively inactivates a wide array of potentially harmful microorganisms found on hands.

The World Health Organisation (WHO) recommends the use of ABHR based on the following:

- Rapid and broad-spectrum microbicidal activity with minimal risk of generating resistance to antimicrobial agents.
- Suitability for use in resource-limited or remote areas with lack of accessibility to hand wash basins or other resources for HH (including clean water, paper towels, etc.).
- Improve compliance with HH by making the process faster, available at the point of care and more convenient.
- Economic benefit by reducing annual costs for HH and HAI.

The areas on the hands most often missed are the fingertips, which are the most contaminated, and traditionally the last step in the technique. It is also the part of the hand that is most frequently in contact with patients.

**Method:**

Duration of the entire procedure takes 15 seconds minimum or as long as it takes for the alcohol to dry completely. See **Appendix 3**.

**Hygienic hand wash technique**

**Method:**

Duration of the entire procedure should be no more than 40 to 60 seconds. (**Appendix 3**). Hand washing begins with palm to palm rubbing of liquid soap.

**Surgical hand preparation technique**

Pre-operative hand preparation refers to the hand disinfection procedure prior to any surgical procedure. Surgical hand preparation should **reduce resident flora** from the hands of the surgical team for the duration of the procedure, to minimise the possibility of bacterial contamination from hands into an open wound.

Pre-operative surgical hand preparation process:

- Pre-operative surgical hand preparation with soap and water.

**WHEN:** On arrival in the operating theatre and after having donned theatre clothing (cap and mask).

- Pre-operative surgical hand rub

**WHEN:** Can only be performed on clean hands and between surgical procedures (if hands are not visibly soiled).

**Pre-operative surgical hand preparation with soap and water**

**"Scrub"** *does not involve using a nailbrush or any other coarse material to remove skin.* It is carried out by vigorously rubbing the hands and forearms with the other hand continuously for a minimum of two minutes. This is a two-stage process.

These steps aim to remove *transient* flora: Remove all jewellery (rings, wedding bands, watches, bracelets, traditional or religious strings or skins before entering the operating theatre.

- Wash hands with plain soap and water. Wash the wrists and forearms to the elbows as well.
- Pay attention to the areas underneath the nails.
- **Nailbrushes should not be used as they may damage the skin** and encourage shedding of cells and bacteria.
- Rinse the arms, wrists and forearms with tepid water.
- Dry hands and arms with paper towels.

Surgical scrub with antiseptic/antimicrobial soap aims to reduce the resident flora/microbial load. During surgery, microbes can be inadvertently released from micro tears in gloves and expose the patient to infection.

- **Use antimicrobial soap** (4% chlorhexidine gluconate) for this stage.
- "Scrub" each side of each finger, between the fingers, and the back and front of the hand. This should take a minimum of two minutes.

**Multimodal approach to improve hand hygiene compliance.**

Hand hygiene can be improved by following the WHO **multimodal improvement strategy**. The key components of the strategy are:

**Table 5: Improving hand hygiene through a multimodal strategy.**

| | |
|---|---|
| System change – build it<br><br>(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources) | WHO Core Components standards - the adequate number and appropriate position of hand hygiene facilities should be implemented in all health care facilities.<br><br>• Put in place/improve the infrastructure, including the reliable availability of ABHR and access to a safe and continuous supply of water, soap, and towels, including a recurring budget required for this. Materials and equipment to perform appropriate hand hygiene should be readily available at the point of care.<br>▪ Put in place/improve a mechanism to ensure hand hygiene products are easily accessible (e.g., within arm's reach) at the point of care to achieve the Your 5 Moments for Hand Hygiene.<br>▪ Make available functional hand hygiene facilities for all patients, family members, caregivers and any other visitors, as well as within 5 metres of the toilets, and entry/exit of the facility, in waiting and dining rooms and in other public areas.<br>▪ Put in place an up-to-date policy/standard operating procedure that is targeted at local actions including how access to products can be assured. |
| Training and education – teach it.<br><br>(to improve health worker knowledge) | A hands-on, practical approach is known to improve compliance.<br><br>▪ Put in place the provision of regular (at least annual) training for all HCWs on the importance of hand hygiene, based on the "My 5 Moments for Hand Hygiene" approach, and the correct procedures for hand rubbing and hand washing.<br>▪ Allocate responsibility to check that current training and education programmes include the correct hand hygiene recommendations - map guideline recommendations to training content.<br>▪ Assess training needs.<br>▪ Identify the expertise required to conduct training. |
| Monitoring and feedback – check it<br><br>(to assess the problem, drive appropriate change and document practice improvement) | • Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities)<br>• WHO Core Component standards - national IPC monitoring and evaluation programme should be established to assess the extent to which standards are being met and activities are being performed according to the programme's goals and objectives. Hand hygiene monitoring with feedback should be considered as a key performance indicator at the national level.<br>• Monitoring and reporting on hand hygiene compliance includes:<br>o Conduct direct observation by trained observers using the WHO observation form and protocol.<br>o Consider self-reporting by staff or by patients.<br>o Consider indirect methods (e.g., monitoring product consumption or number of times sinks or dispensers are used)<br>o Undertake acceptability and tolerability of products (involve staff in choosing hand hygiene products to secure their buy-in)<br>o Availability of products at the point of care, as well as reminders. |

| | |
|---|---|
| | The WHO Hand Hygiene Self-Assessment Framework also provides a comprehensive way to improving all aspects related to sustained improvement. |
| Reminders and communication – sell it.<br><br>(to promote the desired actions, at the right time, including campaigns) | ▪ Prompt and remind HCWs about the importance of hand hygiene and about the appropriate indications and procedures for performing it by using well placed, accurate reminders which re checked and replaced regularly. |
| Culture and change – live it<br><br>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models) | ▪ Create an environment and the perceptions that facilitate awareness-raising about patient safety issues while guaranteeing commitment to all components of hand hygiene improvement as a high priority at all levels, including:<br>o Active participation at both the institutional and individual levels.<br>o Awareness of individual and institutional capacity to change and improve (self-efficacy).<br>▪ Partnership with patients and patient organizations/local leaders.<br>▪ Provide a hierarchy of responsibilities and demonstrate leadership for hand hygiene action. |

**Patients and visitors**

- Patients should be given health education on HH to encourage good practice.
- Patients should have access to both ABHR and HH facilities with running water and soap as well as paper towels to dry the hands.
- Bed bound patients should be offered the means for hand-cleansing after bedpan/urinal use for example, by offering them wet wipes, soap and water or ABHR (if hands are not soiled visibly).

**Note:** If the health worker has a dermatological condition such as an allergy to the hand hygiene products, psoriasis or dermatitis, report to the Occupational Health Department for advice on how to look after your hands.

Latex free gloves should be used for health workers with a latex allergy.

**Note: For more information about the implementation of a hand hygiene strategy or using the multimodal improvement strategy to improve compliance, consult the WHO *A guide to the implementation of the WHO multimodal hand hygiene improvement***

## 3.2 Personal Protective Equipment

**Key practice points**

- Use PPE to protect against exposure to body fluids that may contain potentially pathogenic microorganisms.
- Perform the correct, safe procedures to don and doff PPE.
- Apply the WHO *Your 5 Moments for Hand Hygiene* to clean hands at the right time even when PPE is worn.
- Apply recommended modifications to rationally and safely use PPE when resources are limited.

- Focus on a combination of a supportive infrastructure, the use of reminders (e.g., posters), training and education (consistent with guideline content), monitoring and evaluation (using a valid and reliable approach) and a safety culture, to make it more likely PPE will be worn in right way at the right times.

**Why do we use PPE?**

- Personal protective equipment (PPE) is one part of standard precautions for the safe delivery of healthcare when exposure to body fluids is anticipated and the practice relies on correct and consistent use from individuals.
- PPE, when used correctly, provides a physical barrier that protects the eyes, nose, mouth, other mucous membranes, skin and clothing of the healthcare workers from body fluids that may contain potentially pathogenic microorganisms, such blood, vomit, urine, semen, sweat and saliva. A range of organisms can be found within body fluids (refer to Chapter 7 transmission-based precautions).
- PPE reduces the risk of contamination to hands, the risk of germ dissemination to the environment and of transmission from the health-care worker to the patient and vice versa, as well as from one patient to another.
- PPE therefore includes use of gloves, aprons, gowns, medical masks, respirators, boots and eye protection according to risk. The correct putting on, removal and discarding of PPE also prevent the transmission of microorganisms to patients, other healthcare staff and the environment.

**When to use PPE?**

- Before undertaking any activity or procedure, HCWs should wear the PPE that provides appropriate protection against the risks associated with the procedure or task being undertaken.
- PPE should be always readily available and accessible to the health care workers in the health facility. PPE should also be available for caregiver/visitors who are providing care to patients in the facility and who may be exposed body fluids (see table 7).

**Table 6: Type of PPE and when to use.**

| Type of PPE: | Indication for use: |
|---|---|
| Non-sterile gloves (examination gloves) – non powdered latex or nitrile gloves are recommended | When a HCW is performing patient care activities that may involve blood or other body fluids or handling of contaminated materials, e.g., when cleaning, gloves should be used (this includes contact with mucous membrane and non-intact skin). |
| Sterile gloves (surgical gloves) – latex or nitrile | Mostly used for surgery but also other invasive procedures that require an aseptic procedure. They are disposable and individually wrapped items.<br><br>In the case of double-gloving, a routine change of the outer gloves during long surgeries is often recommended by health care practitioners. However, there is no evidence to support these practices. |

| Type of PPE: | Indication for use: |
|---|---|
| | Gloves for Obstetric Use - elbow-length sterile obstetric gloves can be used for obstetrical procedures given the increased risk of exposure to large amounts of bodily fluid. |
| Gown<br><br>Fluid-resistant and impermeable gowns offer fluid protection and are advised for body fluid exposure and are usually long sleeved. | When performing a procedure that can involve body fluid exposure, a fluid-resistant gown should be used, i.e., during procedures likely to generate contamination from body fluids.<br><br>During surgical procedures, a *sterile* surgical gown is worn to protect the sterile field and prevent transfer of microorganisms from HCW to patient, in addition to protecting the wearer. |
| Plastic Apron | In routine care, if splashes of body fluid are likely, use of plastic apron may also be necessary on top of the cloth reusable gowns (if they are being used e.g., during delivery or clean/aseptic procedures or invasive surgical procedures). |
| Medical Mask (may also be known as a surgical mask)<br><br>Masks made from based cotton/material or paper are not fluid-resistant and are not considered an effective barrier within the health care setting. | Masks provide a physical barrier to prevent splashes from reaching a HCW's mucous membranes, e.g., during procedures likely to generate splashes into a HCW's mouth and/or nose. Masks also act as a barrier to block oral secretions from HCW to patient (e.g., during surgery, lumbar punctures).<br><br>Any time splashing is anticipated, eyes must be protected as well; thus, masks are worn in combination with other PPE (e.g., goggles).<br><br>Some patients with respiratory symptoms should wear masks to protect others.<br><br>For information on the use of masks and respirators for acute respiratory infections refer to the TBP section. Note, respirators may be required for certain aerosol generating procedures even when patient is not on airborne precautions.<br><br>During an outbreak, use of masks should be guided by disease specific guidelines. |
| Face shield, goggles or safety glasses<br><br>Choose protective eyewear that fits well on the face, is comfortable, and allows sufficient peripheral vision. Ensure a secure fit and to avoid excessive fogging; when possible, use eyewear with anti-fog coating. | If splashes of blood and body fluid are likely to eyes (e.g., during delivery or invasive surgical procedure), then face shield, goggles or safety glasses should be used.<br><br>**Note:** Personal eyeglasses and contact lenses are NOT considered protective eyewear. A mask with a fitted plastic shield for the eyes may also be available and is acceptable. |

**How to use PPE**

General principles on how to use PPE safely:

- Before donning, perform hand hygiene (this action will relate to the 5 Moments for Hand Hygiene)

Consider appropriateness of PPE for the task

- Check PPE for small holes or tears and expiry date.
- Check PPE for the proper fit/size (to minimize adjusting during patient care)

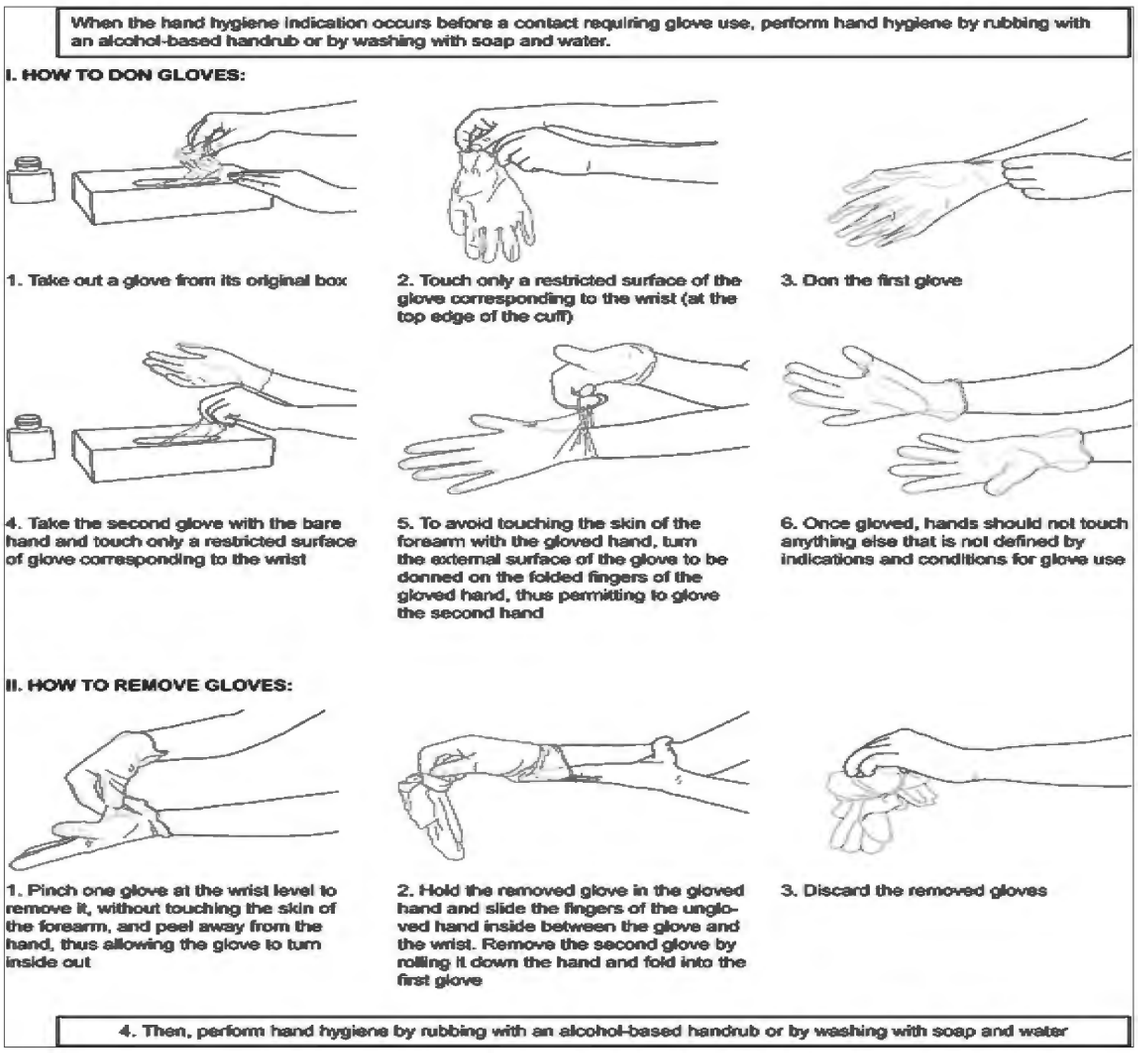
Any item that ties should be tied securely, but not too tight that extra manipulation will be needed to take it off.

- Once PPE has been put on, avoid touching or adjusting it. HCWs should avoid touching their face to protect their mucous membranes from potential contamination.
- If PPE becomes heavily soiled with blood or body fluids, it should be changed. PPE should also be changed if it becomes damaged (e.g., glove tears, gown rips). After any time, PPE is removed, hand hygiene should be performed.
- Safely remove PPE immediately after use. When PPE is removed, there is potential for contamination from PPE to hands, mucous membranes, clothing, and skin. This is why in general the dirtiest PPE is removed first. PPE should be removed slowly and carefully and discarded in the appropriate waste bin.
- Ensure the outside of PPE does NOT touch skin or any part of the body.
- Perform hand hygiene after immediately PPE is removed and disposed of.

**How to put on and remove gloves**

- Perform hand hygiene (this action will relate to the 5 Moments for Hand Hygiene)
- If a gown is being worn, ensure the cuff is covered by the glove.
- If full PPE is being worn, gloves should be first in the doffing process.

**Figure 5: How to don gloves.**




**How to put on and remove basic PPE (see appendix 5)**

How to use a masks/face shield

- Put on a mask/other face protection after the apron/gown, if deemed necessary (and before gloves, gloves are the last step if full PPE is being worn).
- Masks should fully cover the mouth and nose and be worn throughout the duration of the procedure for which it is required.
- Remove after gloves and apron/gown.
- Ensure you take masks off from the straps, avoid touching the mask.

**Donning of extended PPE (refer to Annex 6)**

**Removal / doffing of extended PPE (refer to Annexe 7)**

**Considerations for PPE in facilities with limited resources**

- Risk assessing PPE use is part of its rational use. Overuse is a waste of resources.

- The use of double gloving has not been found to be evidence based and can waste resources.
- The use of heavy-duty gloves for cleaning should be applied rather than the inappropriate use of medical gloves.
- Vinyl gloves are acceptable for short procedures/tasks (e.g., suctioning endotracheal secretions, removing IV lines) that involve minimum risk of glove tears, have low risk of exposure to contaminants, and involve minimal stress on the gloves, if they are the only type of examination glove available. They are however not routinely advised for exposure to body fluids.
- It has been suggested, during the COVID-19 pandemic, that extended use of medical masks where community transmission is prevalent is acceptable. A risk assessment must be undertaken). Health care facilities must outline temporary strategies for rational but safe use of PPE (including extended use, reprocessing and alternative PPE) where necessary.
- Where efficient decontamination services exist, reusable (non-disposable) PPE is acceptable.

**Additional considerations**

- Hand hygiene should be performed as per the WHO 5 Moments for Hand Hygiene whether PPE is worn or not; the Moments remain the same and apply when PPE has been removed.
- Gloves should not be worn routinely.
- No standardized, validated and affordable procedure for safe glove reprocessing exists. Every possible effort should be made to prevent glove reuse in health-care setting.

**PPE should be:**

- available close to the point of use and readily accessible.
- stored in a clean/dry area away from direct sunlight or other sources of heat (e.g., a heater) to prevent contamination and deterioration in quality.
- Preferably single use: if reusable, there must be a clear policy and standard operating procedures for placement in laundry bins after use and removal for laundering and reprocessing. Personnel tasked with reprocessing must be trained to work safely and be provided appropriate PPE.
- Available in several sizes so HCWs can choose the right size. When PPE does not fit (too big or too small), it can impair the performance of the task/procedure being performed, interactions with patients, comfort of HCW, and the PPE can tear, rip, or break.

**Table 7: Improving PPE use through a multimodal strategy.**

| | |
|---|---|
| System change – build it.<br>(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources) | ▪ Put in place/improve systems to reliably procure, distribute and manage PPE, alcohol based hand rub (ABHR), soap and towels, environmental cleaning products and waste disposal (functional collection containers) products, including a dedicated budget.<br>▪ Provide SOPs for PPE use at the health facility, including safe use and replacement of supplies and hand hygiene, cleaning and waste disposal actions.<br>▪ As PPE is less effective than replacement or removal of hazards, engineering controls, and administrative controls, these aspects should be addressed within system changes. |
| Training and education – teach it.<br>(to improve health worker knowledge) | ▪ Provide practical, regular training to HCWs and visitors caring for patients. Ensure training is in line with guideline content.<br>▪ Allocate responsibility to check that training needs are met, and that training is up to date. |
| Monitoring and feedback – check it.<br>(to assess the problem, drive appropriate change and document practice improvement) | • Put in place/improve regular IPC assessments by IPC focal person and other associated/supporting IPC personnel, including monitoring, reporting and feedback mechanism (roles and responsibilities) focused on compliance with PPE use and its reliable availability at the point of use.<br>• Monitor the possibility of allergies in HCWs, e.g., to latex gloves.<br>• Monitor on occupational health hazard.<br>• Perform and promptly report on staff knowledge and perceptions on rational and safe use of PPE. |
| Reminders and communication – sell it.<br>(to promote the desired actions, at the right time, including campaigns) | ▪ Prompt and remind HCWs, patients, caregivers and visitors about the correct PPE use by using well placed, accurate reminders which are checked and replaced regularly. |
| Culture and change – live it.<br>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models) | ▪ Create an environment that facilitates and role models appropriate PPE use.<br>▪ Use champions/IPC link personnel and role models to promote correct PPE use. |

### 3.3 Environmental Cleaning

**Key practice points:**

- Always clean first! Cleaning is an essential step prior to any disinfection process to remove dirt, debris, and other materials, as dirty surfaces decrease the effectiveness of chemical disinfectants.
- Perform scrubbing (frictional cleaning) as the best way to physically remove dirt, debris, and microorganisms.
- Use cleaning products which are effective for environmental cleaning:

    - The use of neutral detergent solution is essential for effective cleaning, as it removes dirt while improving the quality of cleaning by preventing the build-up of biofilms.
- Focus on the direction of cleaning:
    - From the least soiled areas (cleanest) to the most soiled areas (dirtiest) so that dirtiest areas are cleaned last.
    - From higher levels to lower levels so that debris may fall on the floor and is cleaned last.
- Avoid large-surface cleaning methods that produce mists or aerosols, or disperse dust in patient-care areas, e.g., dry sweeping, mopping, spraying or dusting.
- Do not perform routine bacteriological monitoring to assess the effectiveness of environmental cleaning; this is not generally required.
- Focus on a combination of a supportive infrastructure, the use of reminders (e.g., posters), training and education (consistent with guideline content), monitoring and evaluation (using a valid and reliable approach) and a safety culture, to make it more likely that environmental cleaning will be reliably effective.

Environmental contamination plays an important role in the transmission of micro-organisms and is therefore an important intervention to prevent HAIs. The environment in health facilities refers to the surroundings in which healthcare services are provided to patients and includes patient rooms, surfaces, equipment, and all objects used in connection with delivering of health care services.

Contaminated surfaces can serve as reservoirs of pathogens and play a significant role in transmission during outbreaks, particularly where there is overcrowding in clinical areas. Pathogens settle on surfaces and can be transferred by hands or objects to patients if the environment is not cleaned properly and regularly. The purpose of cleaning the environment is to remove visible dirt and dust and to reduce the level on contamination.

This chapter provides an overview of important cleaning principles to ensure that environmental cleaning is effective, carried out by trained cleaners according to a scheduled routine, uses appropriate cleaning agents and equipment and can be monitored. For more information about environmental cleaning in HCFs refer to *Best Practices in Environmental Cleaning* (2019) and Best practices for environmental cleaning for prevention and control of infections in all health care settings, 3rd edition. Toronto: Public Health Ontario; 2018.

**Note: The routine use of a disinfectant in the environment is strongly discouraged! It is wasteful and promotes anti- microbial resistance. The IPC team will advise when a disinfectant is indicated.**

### Objectives of an environmental cleaning programme

Environmental cleaning programs in HCFs involve resources and engagement from multiple stakeholders and departments. It requires a standardized and multi-modal approach, as well as strong management support. The key elements of an effective environmental cleaning programme include the following:

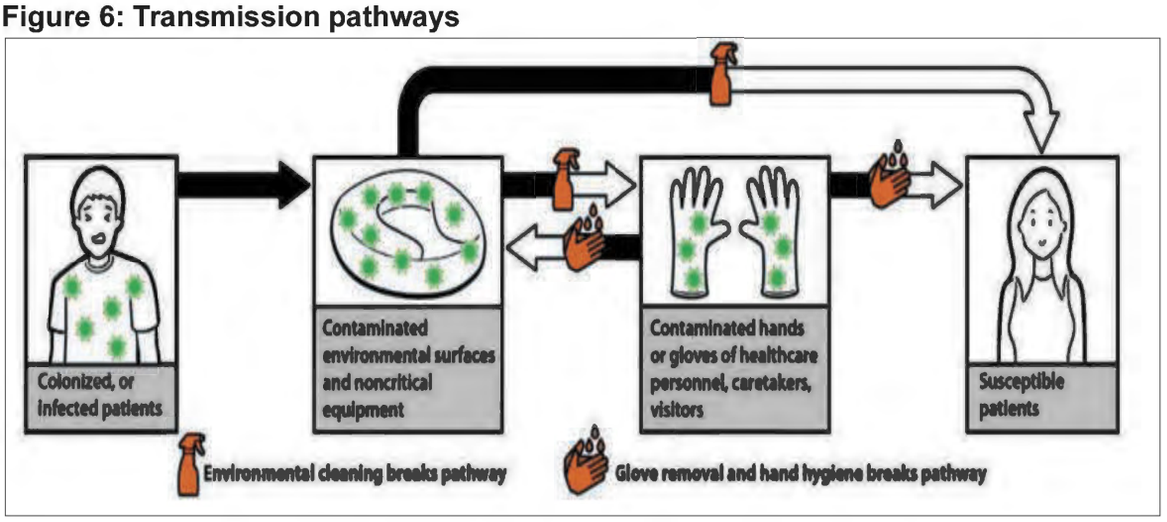
- Organization/administration
- Staffing and training
- Infrastructure and supplies
- Policies and procedures
- Monitoring, feedback, and audit

**Figure 6** illustrates the environmental transmission pathway. Microorganisms are transferred from the environment to a susceptible host through:

- Contact with contaminated environmental surfaces and noncritical equipment.
- Contact with contaminated hands or gloves of health workers during the provision of care, as well as by caretakers and visitors.

Contaminated hands or gloves will also continue to spread microorganisms around the environment. **Figure 6** also demonstrates how these pathways can be broken and highlights that environmental cleaning and hand hygiene (preceded by glove removal, as applicable) can break this chain of transmission.

**Figure 6: Transmission pathways**




### Risk Assessment in Environmental Cleaning

It is important to do a risk assessment when a decision is made about the frequency of environmental cleaning, as well as the priority for cleaning. The following must be taken into consideration: **Table 9** explains the risk-based approach to environmental cleaning.

**Table 8: Risk based approach to environmental cleaning.**

| | |
|---|---|
| Probability of contamination | Heavily contaminated surfaces and items require more frequent and thorough environmental cleaning than moderately contaminated surfaces |
| Vulnerability of patients to infection | Surfaces and items in care areas containing vulnerable patients (e.g., immunosuppressed) require more frequent and rigorous environmental cleaning than surface and items in areas with less vulnerable patients. |
| Potential for exposure to pathogens | High-touch surfaces (e.g., bed rails) require more frequent and rigorous environmental cleaning than low-touch surfaces (e.g., walls). |

**Table 9** provides a recommendation of the frequency of cleaning based on a risk assessment of the area.

**Table 9: Recommendation of frequency of cleaning**

| Area | Frequency | Method | Additional Guidance |
|---|---|---|---|
| Soiled Area | At least once a day (e.g., per 24 hours period) | Clean and disinfect | High-touch and frequently contaminated surfaces, including work counters and sinks, and floors (floors only require cleaning) |
| Clean Area | At least once daily (e.g., per 24 hours period) | Clean | High-touch and frequently contaminated surfaces, including work counters and sinks, and floors (floors only require cleaning) |
| Both | Scheduled basis (e.g., weekly) and when visibly soiled | Clean | Low-touch surfaces (e.g., vents, tops of cupboards) |

**Requirements for Cleaning Staff**

- Staff must be presentable, clean and have good personal hygiene.
- Staff must wear clean, appropriate, and identifiable uniforms. If the uniform becomes soiled or wet, it must be changed.
- Staff working in specialised areas, such as the operating theatres, must adhere to the specified dress code for those areas.
- All staff must be trained in the correct methods of cleaning and disinfection relating to their job category.
- Hand hygiene must be performed (see section on hand hygiene):
  - At the beginning and end of each shift
  - After handling contaminated items
  - Before and after meals or smoking
  - After using the bathroom

- After handling chemicals
- After removing gloves
- If hands are potentially contaminated with blood or body fluids.

- Regular training must be provided to all staff and supervisors and should include the following: cleaning processes, use of equipment, detergents and disinfectants and cleaning methods for various areas in a facility.

    - IPC should be included in in-service training programmes.
    - Records of training must be kept and be available for inspection.

**Note: Staff working in HCFs must be adequately trained, and a record of the training must be kept. Staff are responsible to familiarise themselves with the proper precautions required before entering specialised areas.**

**Note: Clean from the least soiled to the most soiled area (clean to dirty) and from the top to the bottom of a room and from low touch to high touch areas.**

**Personal Protective Equipment for cleaning staff**

**Table 10: PPE for cleaners**

| **Personal Protective Equipment (PPE) for Cleaning Staff Must** | |
|---|---|
|  | **<u>Domestic rubber gloves</u>**<br><br>*(See section on PPE)* (not examination or clinical gloves worn by health workers)<br><br>• For normal cleaning duties.<br><br>• The gloves must reach up to mid arm and offer protection against chemicals and direct contact with dirt.<br><br>• **Gloves must be changed or washed thoroughly with detergent after cleaning each bathroom, each patient room and whenever soiled**.<br><br>• Domestic gloves are reusable and should be discarded only if damaged.<br><br>• Gloves are preferably colour-coded for cleaning different areas – kitchens, bathrooms and toilets. |
|  | **<u>Heavy-duty gloves</u>**<br><br>*(See section on PPE*)<br><br>• Use when in contact with chemicals which may harm the skin.<br><br>• Heavy-duty gloves are usually reusable and must be washed with a detergent after use. |

<table>
<tr><td rowspan="2">  </td><td>

- **Plastic aprons**
- for any cleaning activity that may generate splashes.
- It must cover the front of the uniform.
- The use of colour coded aprons is recommended.

</td></tr>
<tr><td>

**Eye Protection**

- Not recommended routinely.
- It might be necessary in special circumstances, depending on the activity and the anticipated risk of exposure to blood, body fluids, or strong chemicals.

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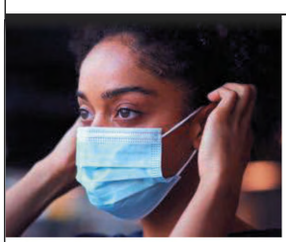
<tr><td>  </td><td>

**Surgical masks**

- For use when entering areas where droplet precautions are required.
- In theatres, outpatient settings, sterile procedures
- In the event of diseases transmitted via aerosols, e.g., Tuberculosis, a fit tested respirator must be worn

</td></tr>
<tr><td colspan="2">Domestic staff working in isolation wards or single isolation rooms must wear the appropriate PPE according to the transmission-based precaution requirements and as guided by the nursing staff.</td></tr>
<tr><td colspan="2">Domestic staff is within their right to refuse to work in an infectious area if appropriate PPE is not provided.</td></tr>
</table>

**Cleaning Principles**

- **Cleaning schedules and procedures must be planned** so that cleaning progresses from the least soiled to the most soiled area and from the top to the bottom of a room (clean to dirty).
- The key to environmental cleaning is the physical removal of microorganisms and debris.
- The use of soap, water and friction (action of washing/scrubbing – “elbow grease”) is effective, cheap and simple and is the first step in the cleaning process.
- No additives (such as scorers, disinfectant, or floor polish) are necessary since this will deactivate the active cleaning ingredients in the detergent. These are usually applied after cleaning has taken place.
- All rooms must be cleaned systematically to prevent missing areas.
- Frequently touched surfaces are a high-risk for cross-transmission and must therefore be cleaned more frequently.
- A hospital- approved detergent must be used for cleaning.
- All disinfectants must be diluted according to manufacturer’s instructions. This is essential for maximum effectiveness. Increasing the strength does not

necessarily increase the antimicrobial activity and decreasing the strength might lead to antibiotic resistance.

### Cleaning Methods

Dust contains large numbers of skin scales, particles, and micro-organisms such as bacilli and Staphylococci as well as the dried nuclei of bacteria such as *Mycobacterium tuberculosis.* These can be transferred to patients or staff when the dust is agitated (dry dusting) or by hands (contact). It is essential that the correct cleaning methods are used. **Table 11** provides a summary of cleaning methods.

**Table 11: Cleaning methods**

<table>
<tr><td colspan="2">Recommended Cleaning Methods</td></tr>
<tr><td>  </td><td>Dusting or wiping of surfaces must always be done with a damp cloth. The cloth must be dampened in clean water containing a detergent. The detergent breaks the surface tension of the water, allowing the dust particles to cling to the cloth. Then the cloth is wrung tightly to remove most of the water before being used to wipe down surfaces. In high-risk areas, when using a bucket and cloth method, solutions should be changed, and buckets and cloths cleaned per bed space. Mix only enough solution for each bed space.</td></tr>
<tr><td>  </td><td>A damp (not wet) floor mop must be used to clean floors. Clean water and detergent must be placed in one bucket and the mop is then rinsed off in the other (dirty) side. The water must be changed frequently. The water must be changed for every bed space in high-risk areas or as soon as the solution becomes discoloured. Mix only enough solution for each bed space.</td></tr>
<tr><td colspan="2"><u>Not Recommended</u><br>Dry dusting is ineffectual since it only displaces dust and is therefore not recommended in HCFs. Feather dusters should not be used. See Table 35 for alternatives.<br>Sweeping: Sweeping with brooms is not recommended for health care facilities since the individual bristles only displace the dust. See Table 35 for alternatives</td></tr>
</table>

### Cleaning Equipment

A colour-coding system is recommended for cleaning equipment to reduce the risk of cross contamination in multiple areas (**Table 12**). The recommended cleaning equipment is set out in **Table 13**

**Table 12: Cleaning colour coding system**

| | |
|---|---|
| Red | Highly contaminated areas, such as toilets, showers, wash-up rooms, Sluice rooms, and bathroom floors; |
| Blue | General areas including wards, offices and hand wash basins in public areas; |
| Green | Bathroom (basin, bath and showers), ward/consulting room basins; |
| White | Kitchen areas (food preparation and serving); |
| Yellow | Isolation areas (only applicable for hospitals as primary health care facilities rarely have to isolate patients). |

All equipment, carts and accessories used by domestic cleaners must be cleaned at the end of each day or more frequently when visibly soiled.

***Note: When applying chemicals to a surface, spray onto a cloth first and then wipe. NEVER spray directly onto a surface as it can cause respiratory irritation.***

**Use of cleaning equipment**

- Cleaning equipment must be used according to specific cleaning tasks.
- Cleaning equipment and solutions must be removed from patient care and food preparation areas as soon as possible after cleaning is completed.
- Cleaning cloths must be segregated according to the approved colour-coding system.
- Change cleaning cloths and mop heads daily or per bed space in high-risk areas and situations. Used cloths and mop heads must be washed with warm water and a detergent before reuse. (If washed in a washing machine, the temperature should be at least 60°C.)
- **DO NOT TOP UP WITHOUT CLEANING THE CONTAINER!** Once completely empty, the containers for cleaning solutions should be washed and dried before refilled**.**
- Cleaning carts and buckets must be constructed of rustproof material that is easily cleaned and free of cracks and crevices. All equipment, carts and accessories used by domestic cleaners must be cleaned at the end of each day or if visibly soiled.
- The equipment must be easy to clean; regularly maintained and a replacement schedule must be available; implemented and records kept thereof.
- Wet equipment (bucket and mop) encourages the growth of micro-organisms and must be kept clean and dry.
- Store in a designated, clearly marked storage area or cleaning closet.
- These closets must be kept neat, clean and free of clutter.
- Scheduled inspections should be done by supervisors.

***Table 13: Cleaning Equipment***

| Recommendations for cleaning equipment | |
|---|---|
|  | Colour coded mops<br><br>Flat mop systems are preferred. The ''sleeves can be washed and tumble dried. "Spaghetti" mops are more difficult to wash as they easily become tangled and cannot be tumble-dried.<br><br>If "spaghetti" mops are used (mop with a cotton string head) for cleaning of floors, they must be thoroughly wrung out and damp, NOT WET, when cleaning the floors. Mops should be washed in very hot water and dried or sent to the laundry at the end of each cleaning session |
|  | Static head mops for cleaning dry floors. These are used to sweep up dry, loose contamination such as dust and sand from the surface of the floor.<br>Normal brooms with bristles should not be used in HCFs |
|  | A double bucket, colour coded.<br><br>Blue for clean and red for used water mounted on a trolley |
|  | Colour coded cleaning cloths for damp dusting and wiping of surfaces. |
|  | Colour coded buckets for water. |

| | |
|---|---|
|  | Janitor trolleys are mounted on wheels with front swivel castors that allow for easy manoeuvring. They are used to keep cleaning tools and consumables secure and tidy while working in the wards. There must be a tray for holding the cleaning materials. |
|  | "Wet Floor" signs are used to warn staff. patients and visitors that floors are wet to minimise the risk of falls |
|  | Floor polisher, scraper and buffer for polishing of floors. |
|  | Window squeegee for cleaning windows. |
|  | Duster to remove dust from surfaces. Can we washed and tumble dried. No feather dusters should be use |
|  | Pistol-grip spray container<br><br>NEVER x spray directly on surfaces. Spray onto the cloth/s first and then wipe over the surface. Cleaning chemicals should be dispensed in dedicated, marked containers. Chemicals may not be decanted into cold drink or other food-containing, e. milk bottles. |

**Chemicals used in Cleaning**

- Majority of routine cleaning should be done with clean water and a neutral health facility grade detergent.

**Detergents**

- The detergents should be compatible with the material they are used to clean.
- Detergents have no killing ability but do remove organic matter which contain microbes and thereby reduce environmental contamination.
- Supplies must be in original containers.
- Bottles used for decanting must be relabelled stating the contents and instructions for use.
- Cleaning should only be carried out with the recommended detergents in accordance with the local policy.
- Detergent must be freshly prepared daily.
- Dilute accurately according to manufacturers' instructions.
- No additives must be mixed with detergents as it will inactivate the cleaning ingredients in the detergent.

**Disinfectants**

- **Disinfectants do not make dirt safe.**
- Disinfectants are inactivated by organic matter such as dirt, blood, faeces, cotton mops and hard water (e.g., water that has a high mineral content).

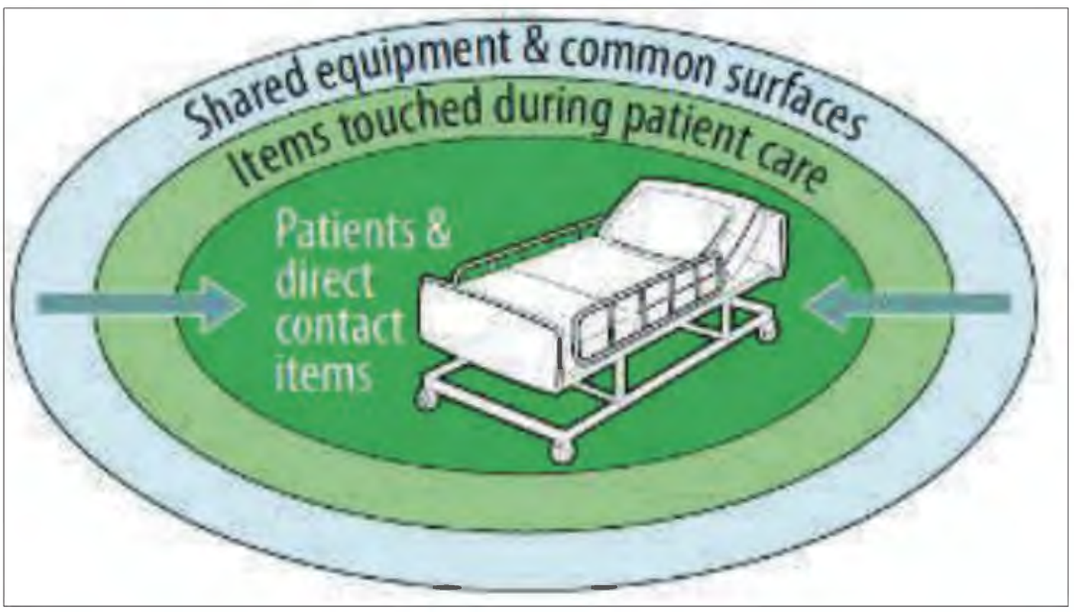
**Note: Disinfectants are not recommended for routine cleaning and should only be used for spillage.**

**Note**: Refer to the detergent, disinfectant and antiseptic section for details on chemicals for environmental cleaning

**Order of cleaning**

- Ensure safety of patients, staff and visitors by placing hazard signs/notices in strategic positions during cleaning in all service areas.
- Clear the area to be cleaned by removing all the light movable equipment, furniture.
- Cleaning should begin from the clean areas moving towards dirty areas thus leaving cleaning of infectious patient areas for last. Cleaning should begin from the top to the bottom and from the furthest area to the closest entrance area .
- Cleaning of floors should be followed by cleaning of areas above it such as walls, windows, medical equipment and furniture.
- Drying of the floor should be ensured by wiping the floor dry with a well wrung-out mop then air dried.

**Figure 7: Clean from far to near**



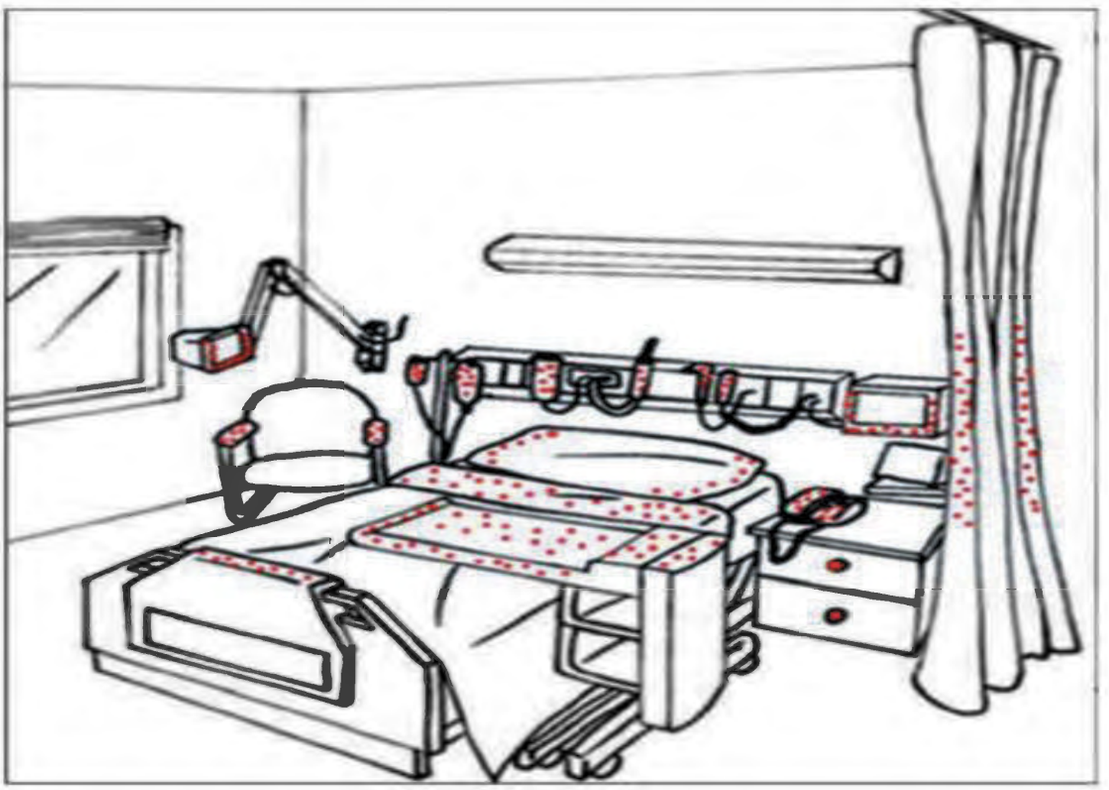

**Type of cleaning**

**Routine cleaning of clinical and non-clinical areas**

All clinical and non-clinical areas which include floors, walls, windows, beds and other medical equipment, curtains and utensils, furniture and empty waste bins must be cleaned. **All cleaning staff must wear appropriate PPE**. A daily cleaning routine with a set frequency for cleaning of all horizontal surfaces and toilet areas is necessary to ensure that optimal cleanliness of the environment is maintained. Some of the areas are included in patient care articles (see section on patient care articles).

High touch areas in high-risk areas such as ICU or NICU should be cleaned more frequently. **Figure 8** provides examples of high touch areas, indicated with a red dot. Appendix 8 provides a SOP for cleaning.

**Figure 8: High touch surfaces**



**Discharge cleaning**

- Remove all linen.
- Clean all surface with a detergent and water.
- Allow to dry.

A cleaning checklist must be used and be visible in all areas. Cleaners must sign the checklist after having cleaned the area. Supervisors should co-sign the checklists daily after confirmed that the areas were cleaned.

**Terminal Cleaning**

Terminal cleaning is performed by cleaners after a patient with an infectious disease has been discharged. While the cleaning procedure is nearly the same as routine cleaning, transmission-based precautions (TBP) should be used, based on the type of TBP that was in place during the admission.

- **Transmission-based precautions:** Cleaning staff must adhere to the following precautions when cleaning the isolation room of a patient in isolation or as directed by the IPC Team or nurse in charge of the clinical area:
- **Airborne precautions:** Use respirators only for patients with TB, measles or chickenpox. Gloves and aprons should be worn. The respirator must be fit tested.
- **Droplet precautions:** Surgical face mask unless otherwise specified by nursing staff. Gloves and apron should be worn.
- **Contact Precautions:** Gloves and plastic apron for housekeeping activities.
- PPE should be donned before entering the room.
- Remove the PPE when leaving the room and perform hand hygiene.
- PPE must be discarded, and hand hygiene performed before exiting the room.

- The cleaning procedure for rooms of patients requiring isolation is the same as other patient rooms. The following should be done:
- **Curtains:** Should be removed and washed.
- **Air vents:** Grills and light fittings are cleaned, and the walls are cleaned starting from the highest to the lowest areas.
- **Floors:** Are cleaned and disinfected.
- **Wards**: All parts of beds are cleaned, especially the mattress and the bed frame underneath the mattress, are cleaned with a clean cloth, rinsed in a detergent solution then left to dry. Bed frames, cot sides, mattresses, bedside lockers (both inside and outside), bedside tables, chairs and any other bed head appliances are cleaned with detergent and water. Hand towel holders, alcohol and soap dispensers, door handles, lights and flooring are also thoroughly cleaned. The hand basins are cleaned, and soap scum is removed.
- **Bathrooms and toilets:** The walls/tiles are washed starting from the highest to the lowest areas. All dirt and soap scum are removed from sinks, basins and bathtubs using an appropriate detergent/cleaning chemical. The inside of the cistern is cleaned using a toilet brush then water is flushed to allow entry of clean, water into the cistern. The rim and bowl of the toilet is sprayed with toilet cleaning chemical and left for few minutes to activate, scrubbed with a toilet brush and wiped clean. The toilet brush and holder are rinsed in running water and or detergent, and dried. Each toilet should have a dedicated toilet brush, especially in isolation cubicles.
- **Showers:** Walls/tiles are washed with water that is mixed with detergent. Ensure that shower heads are cleaned and functional.
- **Food services/kitchens:** Hazard signs are placed at entrances of corridors. As detailed in the preceding sections of this manual, walls are washed starting from the highest to the lowest and furthest to nearby areas. All edges, fixtures and fittings and surfaces, including door handles are washed with detergent. Different food preparation areas in the kitchen have to be cleaned appropriately according to the colour coding systems of the area.
- **EMS**: The same principles for cleaning apply. Frequency of cleaning is defined by clinical practice but should be at least once a day. Adequate cleaning materials must be available, and training of all cleaning staff undertaken. In case of blood or body fluid spillage, follow the recommendations outlined in this manual

Terminal cleaning involves cleaning walls, ventilation shafts and grills and storage areas, floors, windows, ceilings, etc. in all clinical and non-clinical areas. In some situations, temporary closure of such areas is required.

**An appropriate disinfectant is applied to all surfaces during the terminal cleaning process only after thorough cleaning of isolation rooms.**

The use of hydrogen peroxide vapour or UV pulsed light devices for additional disinfection after terminally cleaning following discharge of a patient with MDRO is becoming increasingly common, especially during outbreaks. This is an effective additional measure but must be preceded with cleaning with a detergent and water, followed by a disinfectant. **These additional measures cannot replace normal cleaning and disinfection but serve as an add-on**. The manufacturer or supplier's guidance must be followed.

If terminal cleaning is required, checklists (Appendix 10) must be completed and signed by the IPC practitioner or unit/health facility manager before another patient can be admitted to the room.

**Do not use ABHR to disinfect surfaces or equipment, because it normally contains an emollient.**

**The room can be used after all surfaces are dry. Isolation signs are not to be removed until terminal cleaning is completed.**

**General points**

- **Cleaning equipment**: Use only the equipment that is marked for the cleaning of isolation rooms, e.g., double bucket system, mop, and dust trolley.
- **Linen:** Handling the linen according to the dirty linen policy. Carefully remove the bed linen and curtains and send it to the laundry.
- **Mattresses**: If plastic covers are torn or damaged, these should be replaced, and the mattresses and pillows sent for decontamination.
- If the plastic covers of the pillows and the mattresses are intact and there are no visible signs of contamination, then these should be washed down with soap and water, dried and wiped off with alcohol.
- **Furniture:** The beds, over-bed tables, chairs, lamps and lockers must be wiped down with soap and water, dried and wiped down with alcohol.
- **Medical equipment:** Ventilators, ivac pumps, monitors, leads, drip stand, oxygen regulator, stethoscope, saturation and ECG probes and the emergency trolley equipment must be thoroughly cleaned with soap and water and wiped down with alcohol. Send the ambubag to CSSD and hand the ventilator over to the technologist for further decontamination.
- **Other equipment:** Such as suction bottles, silicone tubes, circuits, inhalation masks, other bottles, transducer domes and used procedure packets must, be placed in a transparent plastic bag that is marked infectious and send to CSSD for re-processing. Thermometers should be cleaned and disinfected according to the **manufacturer's guidelines.**
- **Environment:** Floors and walls must be wiped down with detergent and water and if there are any bloodstains, wipe over with hypochlorite after the wall is clean. Windows, storage cupboards, curtain rails, doors, door handles, hand wash basins must be wiped down with soap and water.
- **Lotions and solutions:** Discard all the left-over containers with liquids and medication.
- **Patient care articles:** Bedpans, urinals, bowls and jugs should be cleaned and then heat disinfected.

**Blood Spillages**

- All spillages must be cleaned up immediately.
- A pair of domestic gloves must be worn.
- A pan and brush should be used to remove glass, or any other solid material mixed with the blood.

- Place contaminated bits of glass carefully in a newspaper and wrap tightly ready for disposal.
- Place several paper towels to mop up the spillage and place these in a red plastic waste bag.
- Surfaces visibly contaminated with blood or body fluids should also be cleaned immediately with water and a detergent.
- Inspect the area to ensure no signs of spillage remain.
- Wipe over with 10:10 000 ppm available chlorine.

**Handling of Waste**

Domestic staff must wear thick domestic (rubber gloves) and protective clothing when handling waste. See section on PPE.

**Pest Control**

Pest control does not fall directly under IPC; however, all health facilities should have a pest control programme in place which clearly sets out procedures necessary to prevent and control the breeding of pests within the HCF and to manage the use of pesticides in line with the environmental health norms and standards to prevent the spread of infections via insects. The programme should include facility inspections, a pest control schedule, based on the degree of infestation and a risk assessment. Only approved pesticides and registered service providers must be contacted for pest control services. Assistance may be obtained from a commercial pest control agency if necessary (e.g., in the case of rodents). For primary health care facilities in rural areas and facilities where insects are not a big problem, spraying with a high-performance residual insecticide spray is acceptable. Appendix 9 discuss different types of pests and their control in more detail.

**Table14: Environmental cleaning & disinfection using a multimodal strategy.**

| | |
|---|---|
| System change – build it. *(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)* | ▪ Put in place/improve access to the right infrastructure, water, equipment including PPE, supplies and an environment that is designed and planned to facilitate safe and effective cleaning, including dedicated budget.<br>▪ Provide SOPs/illustrative procedures for use at the frontline including schedules and responsible staff |
| Training and education – teach it. *(to improve health worker knowledge)* | ▪ Put in place/maintain a program of routine, practical training and education (on job training and coaching, mentorship, orientation etc) and periodic retraining for all cleaning staff undertaking cleaning and disinfection procedures that is in line with guideline content.<br>▪ Allocate responsibility to check that training needs are met, and that training is up to date |
| Monitoring and feedback – check it *(to assess the problem, drive appropriate change and document practice improvement)* | • Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities)<br>• Develop/maintain a facility cleaning monitoring program which provides feedback, perform and report on staff knowledge and behaviours and checks on awareness raising materials for wear and tear. |

| | |
|---|---|
| Reminders and communication – sell it *(to promote the desired actions, at the right time, including campaigns)* | ▪ Prompt cleaning actions using different awareness raising materials (e.g., use of checklists or job aides on cleaning carts). Put in place a system to replace these regularly |
| Culture and change – live it *(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)* | ▪ Managers and leaders at every level of the HCF show their visible support for a clean environment to help develop and reinforce a culture of patient and staff safety<br>▪ A program of regular supervision and feedback is in place to support quality improvement and learning (i.e. embedding WASH FIT) |

### 3.4 Respiratory Hygiene:

**Key practice points**

- Cover your mouth and nose.
- Ensure disposal of used tissues into an appropriate waste bin immediately after use
- Perform hand hygiene after any contact with respiratory secretions.
- Focus on a combination of a supportive infrastructure such as products to ensure cough etiquette, the use of reminders (e.g., posters), training and education, monitoring and evaluation and a safety culture, to make it more likely that respiratory hygiene will be performed in the right way at the right time.

**Why do we perform respiratory hygiene and cough etiquette?**

Respiratory and cough hygiene is designed to minimize the risk of transmission of acute respiratory infections. It is applicable for both staff, patients, visitors and caregivers.

When and how to perform respiratory hygiene and cough etiquette

- When sneezing or coughing:
  - cover the nose and mouth with a disposable tissue or flexed elbow.
  - always face away from others.
- Discard used tissues immediately into an appropriate waste bin. Do not put the tissue into a pocket.
- If disposable tissue is not available cough / sneeze into bent elbow.
- Clean hands immediately after coughing, sneezing, handling tissues or after touching respiratory secretions, e.g., on a contaminated object / surface.

It some situations, the additional measure of offering a medical mask to patients (e.g., with suspected COVID-19, TB, etc.) while they are in waiting/public areas or in cohorting rooms is recommended.

***Considerations for respiratory hygiene in facilities with limited resources***

- If masks are being offered but supply is limited, local production is possible as a temporary solution. A system should be in place for a local authority to assess any proposed production according to specific minimum standards

and technical specifications (see also chapter 3.1, hand hygiene, with regards to local production).

Additional considerations

Ensure regular cleaning of areas where those who have symptoms or are suspected of having acute respiratory infection are waiting or residing.

**Table 15: Improving respiratory hygiene and cough etiquette using a multimodal strategy.**

| | |
|---|---|
| System change – build it *(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)* | ▪ Put in place/improve systems to reliably procure, distribute and manage disposable tissues, medical masks, alcohol based hand rub (ABHR), soap and towels, environmental cleaning and waste disposal (functional collection containers) products, including a dedicated budget.<br>▪ Provide SOPs for respiratory hygiene at the health care facility, including safe use and replacement of mask and tissue supplies, cough etiquette and associated hand hygiene, cleaning and waste disposal actions. |
| Training and education – teach it *(to improve health worker knowledge)* | ▪ Provide practical, regular training to HCWs, patients, caregivers and visitors. |
| Monitoring and feedback – check it *(to assess the problem, drive appropriate change and document practice improvement)* | • Put in place/improve regular IPC assessments by IPC focal person and other associated supporting IPC personnel, including monitoring, reporting and feedback mechanism (including roles and responsibilities) related to compliance with respiratory hygiene recommendations. |
| Reminders and communication – sell it *(to promote the desired actions, at the right time, including campaigns)* | ▪ Prompt and remind HCWs, patients, caregivers and visitors about the importance of respiratory hygiene by using well placed, accurate reminders which are checked and replaced regularly. |
| Culture and change – live it *(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)* | • Create an environment that facilitates and role models respiratory hygiene. |

## 3.5 Safe Handling of Linen and Laundry

**Key practice points:**

- Place soiled linen in appropriate bags at the point of generation and wash with soap and water, rinse and dry in a covered, dedicated place.
- Clean and soiled linen are transported and stored separately, in different (marked) bags/containers.
- Clean beds, mattresses and pillows between use on each patient and whenever soiled with body fluids.
- Change bed linen between use on each patient daily and whenever soiled.

- Clean and autoclave soiled linen before being supplied to operating rooms or theatres.
- Focus on a combination of a supportive infrastructure, the use of reminders (e.g., posters), training and education (consistent with guideline content), monitoring and evaluation (using a valid and reliable approach) and a safety culture, to make it more likely that linen will be managed safely and effectively at the right times.

**Why we perform safe handling of linen.**

- Soiled linen can be contaminated with pathogenic microorganisms, however, actual disease transmission from linen has been demonstrated to be negligible if it is handled, transported and laundered in a manner that avoids dispersal.
- Rare, serious outbreaks have been associated with inappropriate management of hospital linens often caused by errors in the washing process, contamination during post-cleaning transportation and inappropriate storage conditions.
- Safe handling of linen protects staff from unnecessary exposures to harmful microorganisms. Most staff exposures have been attributed to failure to use appropriate PPE and/or inappropriate sorting of linens.

Note: There is no evidence that linen used by patients who are under isolation precautions carries any greater microbial load or risk of disease transmission than patients who are not in isolation.

How and when to perform safe handling of linen

**Removal:**

- Dirty linen should be carefully removed with minimum agitation to minimize dispersion of the microorganisms into the air.
- Wet or linen saturated with body fluids should be folded with the wet areas inside to minimize contamination of the health care facility environment.
- Linen should be removed when soiled, daily and after each patient use, i.e., on discharge.

**Collection/transport:**

- Dirty linen bags should not exceed the weight of 20 kgs and should be securely tied or otherwise closed to prevent leakage.
- No rinsing or pre-disinfection of soiled linen at the point of generation is required. Soiled linen should be safely transported for laundering using a dedicated, labelled cart or container to avoid any accidents or spills along the way.
- Ensure no miscellaneous items (e.g., needles) are collected with linen. Such items constitute a special hazard to laundry staff.
- Soiled linen should be placed into fluid resistant bags at the point of generation as soon as possible.

**Laundering:**

- Every healthcare facility should have a dedicated laundry area
- Once the soiled linen arrives in the laundry, the individuals handling it must wear PPE and clean their hands upon removal of PPE. Generally, staff in the laundry are required to wear household or heavy-duty gloves, a gown and/or apron and facial protection. Soiled linen should always be handled carefully, never shaking it.
- Carefully remove it from the bag or container onto the sorting table, watching for possible sharp objects or heavily soiled items.
- Sorting of dirty linen should be done separate from clean linen areas with limited traffic. Work surfaces are at or above the waist height. The sorting area needs to be equipped with disposable gloves, sink, soap and towels. The area should contain sharps containers.
- A washing machine is preferred for cleaning used linen over hand laundering. It is always important to follow instructions from the washer/dryer manufacturer.

**Otherwise,** best practices include:

- Using hot water (70–80°C X 10 min) [158–176°F]) and an approved laundry detergent.
- Disinfectants are generally not needed if soiling is at low levels if using a commercial dryer.

**Considerations for linen management in facilities with limited resources**

- If laundry services (with hot water) are not available, soiled linens will require manual laundering. Manual laundering steps include:

- Immerse in detergent solution and use mechanical action (e.g., scrubbing) to remove soil.
- Disinfect by one of these methods.
~ Immersing the linen in boiling water or
~ Immersing the linen in disinfectant solution for the required contact time and rinsing with clean water to remove residue.
- Allowing to fully dry, ideally in the sun.
- Pre-soaking linen is not required, however, ensure any gross soiling of blood or body fluids is removed at the outset to reduce any risk and contamination.
- When performing manual laundering, be sure to use a large wooden stick or spoon to assist with creating mechanical action to help beat and remove soiling.
- Consider allowing laundry to dry in the sun as a ‘natural disinfectant’.
- Educate patients and care givers on basic principles for appropriate laundering as often they play a critical role in maintaining a patient’s environment and comfort.
- In settings where water access/quality is an issue, address annual water service plans.
- Also see PPE, waste management and hand hygiene sections for additional considerations.

**Additional considerations for linen & laundry management**

- It is strongly recommended that staff in the laundry department are up to date with immunizations, including for hepatitis B.
- Linen for patients must be washed separately from the cloths and mops used for cleaning.
- Any linens that will be used in the operating theatre, such as surgical drapes and gowns, must go to the reprocessing or sterilization department after proper laundering to be sterilized.
- Mattresses and pillows (if used) should have a waterproof cover/mackintosh that allows the cleaner to clean and disinfect them between patient uses. If they do not have this, they cannot be properly disinfected: the IPC focal point should therefore promote use of covers.
- If insecticide-treated bed nets are used, follow the manufacturer's instructions to maintain their effectiveness. At a minimum, launder and re-impregnate every six months, or sooner if visibly soiled or used for isolation.

**Table 16: Safe handling of linen and laundry using a multimodal strategy**

| | |
|---|---|
| System change – build it. *(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)* | ▪ Put in place/improve access to the right equipment including PPE and for hand hygiene, supplies and an environment that is designed and planned to facilitate safe handling of used linen for patient and health worker safety, including a dedicated budget.<br>▪ Provide SOPs for linen management including roles and responsibilities. |
| Training and education – teach it. *(to improve health worker knowledge)* | ▪ Provide a program of routine training and education and periodic retraining for all personnel involved in the collection, transport, sorting, and washing of soiled linen that is in line with guideline recommendations.<br>▪ Allocate responsibility to check that training needs are met, and that training is up to date. |
| Monitoring and feedback – check it. *(to assess the problem, drive appropriate change and document practice improvement)* | • Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) related to linen management including staff knowledge and practices. |
| Reminders and communication – sell it *(to promote the desired actions, at the right time, including campaigns)* | • Prompt and remind workers about safe linen management, e.g., through illustrative guides as well as the correct PPE use. Prompts, e.g., posters, should be well placed, checked and replaced regularly. |
| Culture and change – live it. *(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)* | ▪ Managers and leaders at every level of the HCF show their visible support for linen management to help develop and reinforce a culture of patient safety.<br>▪ A program of regular supervision and feedback is in place. |

### 3.6 Prevention of sharps injuries:

**Key practice points:**

- Avoid giving injections for health conditions where oral formulations are available as the first-line treatment.
- Ensure all HCWs who give injections or draw blood are trained to a competent level in the use of all injection/blood-draw devices available to them.
- All injections, of any kind, should be given in a clean and uncluttered injection preparation area.
- Perform hand hygiene always before preparing injection material, before giving an injection and after giving an injection (as per the WHO 5 Moments for Hand Hygiene).
- Use safety engineered devices that prevent re-use and do not lead to accidental needle stick injuries among HCWs.
- Use single dose vials rather than multidose vials whenever possible.
- Ensure skin is clean and, if indicated, disinfected prior to giving an injection
- After giving an injection, do not attempt to recap the needle; place the syringe and the needle in the sharps container.
- Focus on a combination of a supportive infrastructure, the use of reminders (e.g. posters), training and education (consistent with guideline content), monitoring and evaluation (using a valid and reliable approach) and a safety culture, to make it more likely that sharps injuries will be prevented.

**Why we perform injection and phlebotomy safety and sharps injury prevention.**

Each year, over 16 billion injections are provided with over 70% of these injections unnecessary. Unsafe injection practices cause up to 315,000 Hepatitis C (HCV) infections, 1.7 million Hepatitis B (HBV) infections, and 33,800 HIV infections, annually worldwide.

In health care settings, injuries from needles or other sharps are the number-one cause of occupational exposure to blood-borne infections. Other unsafe practices, such as incorrect collection and disposal of used injection equipment, expose healthcare workers and the community to the risk of needle stick injuries.

An **unsafe injection** is one that is given with unsterile or improper equipment or technique. A **safe injection** is one that does not harm the recipient, does not expose the provider to any avoidable risk and does not result in any waste that is dangerous to others. The term “sharps” refers to any sharp instrument or object used in the delivery of healthcare services including hypodermic needles, suture needles, scalpel blades, sharp instruments, IV catheters, and razor blades.

How and when to perform injection and phlebotomy safety and sharps injury prevention

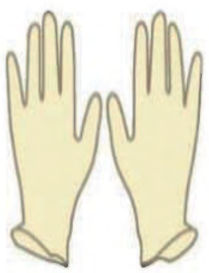
Clean workspace:

- The first and foremost step in preparing an injection of any kind is a clean and uncluttered injection preparation area.
- It is imperative that contamination should be avoided. This includes preparation areas not being next to sinks where splashes could occur.

Administration:

- Gloves are not required for routine intradermal, subcutaneous or intramuscular injections if your skin is intact, or the patient's skin is intact.
- Gloves should be used ONLY when indicated.
- See Table 18 for indications and precautions with respect to appropriate glove use.

**Table 17: Indications for glove use in injection practice.**

| Key elements | Indications | Precautions |
|---|---|---|
| Glove use  | Wear non-sterile, well-fitting, single-use gloves:<br>• When contact with a patient's blood or other potentially infectious materials (e.g., body fluids, moist body substances and saliva [in dental procedures]), mucous membranes and non-intact skin is anticipated.<br>• During venepuncture or venous access injections, due to the potential for blood exposure at puncture site.<br>• If HCW's skin is NOT intact (e.g., through eczema, cracked or dry skin).<br>• If patient's skin is NOT intact (e.g., through eczema, burns or skin infections). | When undertaking injections:<br>• **DO NOT** use gloves for routine intradermal, subcutaneous, or intramuscular injections if your skin is intact OR if the patient's skin is intact.<br>• **DO NOT** use the same pair of gloves for more than one patient.<br>• **DO NOT** wash gloves for reuse.<br>• Gloves **DO NOT** provide protection against needle-stick or other puncture wounds caused by sharp objects.<br>• Needles, scalpels, and other sharps should be handled with extreme caution |

- Always use sterile injection equipment.
- Always use a new syringe and a needle opened from a new packet.
  - Be sure to visually inspect the packaging for any visible damage, moisture or any indication of possible contamination or error.
  - Discard the device if the package has been punctured, torn, or damaged or if the expiry date has passed.
  - Hand hygiene must always be performed before preparing injection material, before giving an injection and after giving an injection.
- If the injection site is visibly dirty/soiled, wash with soap and water
- Skin disinfection may be required. When indicated, be sure to:
  - Use a 60–70% alcohol-based solution on a cotton wool ball or single-use swab
  - wipe from the centre working outwards, avoiding the same area
  - allow to dry for 30 seconds.
- For culture or donation, disinfect with 2% chlorhexidine (CHX) in 70% alcohol
  - For children of age 2 months or less: use alcohol alone.
- See table 19 below for a summary of skin preparation for different types of injection.

**Table 18: Skin preparation for different types of injection**

| Type of injection | Soap and water | 60–70% alcohol (Isopropyl alcohol or ethanol) |
|---|---|---|
| Subcutaneous | Yes | No |
| Intramuscular | Yes[a] | Yes[a] |
| Immunization | Yes | No |
| Venous access | No | Yes |

[a] Unresolved issue because there is a lack of evidence on the need to disinfect the skin before intramuscular injections.

**Sterile safety engineered syringes and related injection equipment.**

- The surest way to protect against unsafe injections is to use devices that have been engineered so they cannot be re-used and do not lead to accidental needle stick injuries among HCWs.
- Syringes and blood-draw devices are available with sharps injury protection (SIP):
  - possess safety-engineered features to protect health workers from needle stick injuries and resulting infections.
  - usually, a sheath or hood sliding over the needle, or the needle automatically or manually retracts into the barrel.
- It is recommended that syringes with RUP and SIP be exclusively used for all injections, other than where standard disposable single use syringes are required.
- The following medical procedures require standard syringes:
  - Administering multiple medicines in same syringe.
  - Flushing of intravenous line.
  - Local anaesthesia to multiple sites.
  - Pushing nutrients through nasal feeding tubes.

**Sterile medication vials and diluents**

- Use single dose vials rather than multidose vials whenever possible.
  - Do not administer medications from single-dose vials or ampoules to multiple patients or combine left over contents for later use.
  - Do not use medications packaged as single- dose or single- use for more than one patient.
- If multidose vials must be used:
  - they should be dedicated to a single patient whenever possible.
  - they should be kept and accessed only in a dedicated medication preparation area.
  - never use the same needle and syringe for multiple patients when using a multidose vial.
- Always pierce the vial with a sterile needle and avoid leaving the needle in the stopper.
- Disinfect the vial's rubber septum before piercing by wiping and using friction with a sterile 70% isopropyl alcohol or another approved antiseptic swab and allow the septum to dry before inserting a needle or other device into the vial.

- Use fluid infusion and administration sets (e.g., intravenous bags, tubing and connectors) for one patient only. Never use the same IV line and fluid bag/bottle with multiple patients.

**Appropriate collection of sharps:**

- After giving an injection, do not attempt to recap the needle; place the syringe and the needle in the sharps container.
  - If a needle must be re-capped, see image 1 on performing the 'scoop method'.
- Sharps containers should be:
  - sufficient in number so as to be available "*within arm's reach*" in all situations where sharps are generated.
  - puncture-resistant, leak-proof, and sealable when 3/4 full.
- For safe and final disposal of sharps, see Chapter 3.6 on waste management.

**Considerations in facilities with limited resources**

- Always be sure to consider alternatives to injections, when appropriate. Avoid giving injections for health conditions where oral formulations are available as the first-line treatment. When an injection is medically necessary be sure to apply and follow best practices.
- It is never appropriate to reuse any needle or syringe on multiple patients.
- Reporting sharps injuries is critical to the wellbeing of health workers. Even if no formal reporting system, always report a sharps incident to your supervisor for appropriate follow up.
- Always be sure to consider alternatives to injections, when appropriate.
- See aseptic procedures for additional considerations.

**Additional considerations**

- Masks, eye protection and other protective clothing **ARE NOT** required for injection or phlebotomy procedures unless blood splash is anticipated.
- If an injection or related procedure is required for a patient under transmission-based precautions, be sure to follow the necessary indications for wearing the correctly indicated PPE.
- Health care workers should avoid giving injections if their skin integrity is compromised by local infection or other skin conditions (e.g., weeping dermatitis, skin lesions or cuts), and cover any small cuts.

**Table 19: Approaching injection and phlebotomy safety and sharps injury prevention using a multimodal strategy.**

| | |
|---|---|
| System change – build it.<br>*(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)* | ▪ Put in place and maintain access to the right equipment including syringes, needles, PPE, hand hygiene supplies and an environment that facilitates safe injections, phlebotomy and handling of sharps for patient and HCW safety – including receiving adequate prophylactic vaccinations for HCWs. This requires a dedicated budget.<br>▪ Provide SOPs outlining roles and responsibilities |
| Training and education – teach it.<br>*(to improve health worker knowledge)* | ▪ Provide a reliable program of routine training and education and periodic retraining for all HCWs responsible for handling and disposing of sharps that is in line with guideline recommendations.<br>▪ Allocate responsibility to check that training needs are met, and that training is up to date. |
| Monitoring and feedback – check it.<br>*(to assess the problem, drive appropriate change and document practice improvement)* | • Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) on compliance with sharps management including staff knowledge and practices. |
| Reminders and communication – sell it *(to promote the desired actions, at the right time, including campaigns)* | ▪ Prompt and remind staff about sharps prevention use by using accurate, well placed, reminders which are checked and replaced regularly. |
| Culture and change – live it.<br>*(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)* | • 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.<br>• A program of regular supervision and feedback is in place. |

### 3.7 Aseptic Technique

Aseptic technique aims to protect patients by minimizing the introduction of potentially harmful microorganisms into susceptible sites during invasive procedures, including during insertion of invasive devices and their ongoing maintenance, and during wound care. Asepsis is achieved by ensuring that (gloved) hands, equipment and instruments that come into contact with patient's susceptible sites are sterile. WHO Guidelines on Core Components of IPC programmes and the sister document Minimum Requirements state as a minimum that health care facility SOPs should include aseptic techniques (primary care) & aseptic techniques for invasive procedures including surgery (secondary and tertiary care). Surgical asepsis relates to procedures/processes designed to prevent surgical site infection and is covered in chapter 8, IPC in special areas of the hospital (Operating Room).

Four types of HAI (catheter-associated urinary tract infections, catheter-related bloodstream infection, surgical site infection (SSI), ventilator-associated pneumonia) and interventions associated with their reduction/prevention have received the highest attention around the globe in relation to causes of patient harm and the recognized global burden of HAI. This chapter will focus on aseptic technique in relation to these four invasive procedures.

***Key practice points:***

- Perform hand hygiene and appropriate use of gloves is (especially **moment 2** before an aseptic/clean procedure and **moment 3** after blood and body fluid exposure).
- Ensure the key parts of items that will potentially come into direct contact with a susceptible site during an aseptic procedure are sterile and remain sterile throughout the procedure.
- Never reuse single-use medical devices.
- Wear appropriate PPE according to the procedure.
- Perform skin antisepsis according to the procedure using single use antiseptic solutions.
- Focus on a combination of a supportive infrastructure, the use of reminders (e.g. posters), training, education and competency (consistent with guideline content), monitoring and evaluation (using a valid and reliable approach) and a safety culture, to make it more likely that aseptic techniques and device management processes are in place.

**Why aseptic technique is necessary for invasive procedures.**

- Lack of or incorrect adherence to aseptic techniques results in considerable morbidity and mortality.

Aseptic technique protects susceptible sites of the body, from contamination with microorganisms. Contamination can be introduced by hands, contaminated surfaces (via hands) and non-sterile items/equipment.

Even in countries with well-established IPC programs, HAI related to low or inadequate compliance with aseptic techniques is an important public health problem.

**How and when to perform aseptic technique for invasive procedures**

The **how and when** is addressed in the following sections, focused on the different invasive procedures that require application of an aseptic technique.

**Additional considerations**

- The inappropriate use of multi-use antiseptic solutions, sterile saline, water, lubricants, and use of multi-dose vials can result in contamination and documented outbreaks have been reported.
- If a breach in aseptic technique occurs e.g., due to an emergency this should be documented, and the infection risks mitigated as soon as possible.

**Table 20: General approach to using a multimodal strategy for aseptic technique and invasive procedures.**

| | |
|---|---|
| System change – build it.<br><br>(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources) | It is important that all healthcare facilities establish policies regarding procedures that require aseptic techniques and for the Medical Superintendent to ensure that adequate equipment and supplies are available.<br><br>HCF Managers should ensure budgets are made available for necessary equipment and supplies including hand hygiene materials |
| Training and education – teach it.<br><br>(to improve health worker knowledge) | Health care personnel who perform aseptic procedures should be trained in aseptic technique and demonstrate competency.<br><br>It is particularly important for staff to understand why aseptic techniques are needed |
| Monitoring and feedback – check it.<br><br>(to assess the problem, drive appropriate change and document practice improvement) | Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) on aseptic technique including checks on competency |
| Reminders and communication – sell it (to promote the desired actions, at the right time, including campaigns) | Use of visual protocols e.g., photo protocols that highlight images of the step-by-step actions to be taken in the aseptic procedure should be made available at the point of care and where the procedure takes place |
| Culture and change – live it.<br><br>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models) | Senior clinical staff should act as role models for aseptic techniques. Managers should ensure budgets are made available for necessary equipment and supplies including hand hygiene materials |

### 3.7 Patient Placement

Patient placement is a standard precaution, but also an important element of transmission-based precautions. It is essential that HCFs have systems in place to ensure appropriate patient placement to prevent the transmission of pathogens. Consider isolation, depending on resources, when:

- There is a risk of transmission of a suspected or known infectious disease.
- Presence of MDRO.
- The route of transmission is known and the risk of transmission to other patients and health workers is increased.

Depending on the route of transmission a single room or cohort (several patients with the same infectious disease or organism) isolation is indicated. A risk assessment should be done prior to placement. The following questions about possible exposure events should be asked during the risk assessment:

- Travel history
- Occupation and Hobbies
- Previous and recent exposure to healthcare facilities
- Previous infection or colonisation with MDROs
- Recent antimicrobial treatment
- Cough (duration, weight loss, night sweat, loss of appetite, malaise, haemoptysis)
- Fever
- Rash
- Diarrhoea

**Table 21** provides a summary of the degree of risk. Risk is calculated by taking the following factors into consideration: ***RISK = exposure x probability x severity***

**Table 21: Risk Matrix**

| Risk assessment infection control grid | | | |
|---|---|---|---|
| | **HIGH** | **MEDIUM** | **LOW** |
| Patient to staff | | | |
| Staff to patient | | | |
| Saff to staff | | | |
| Patient to patient | | | |

*For example: A patients with a draining wound who was recently admitted in a healthcare facility for surgery and is complaining of pain, fever and an open exudating wound = high risk. A patient with a draining wound obtained through a cut in the foot, without any signs and symptoms of infection or recent healthcare exposure = low risk*

# Chapter 4: HealthCare Waste

## 4.1 Classification of Healthcare Waste

Waste is classified according to its origin and content. **Segregation of waste is the most important step in the waste management process**. The only way to reduce costs, reduce environmental pollution, and minimise risk to self and others is to segregate waste at the point where it is generated. A universal colour-coding system has been developed which links a certain colour to a specific type of waste and therefore supporting appropriate disposal. There should be clearly visible posters indicating what type of waste goes into which colour bag or container. If a container and a plastic bag is used, then both must be of the same colour. **Table 22** provides an overview of the colour coding system.

**Table 22: Description of colour codes of different types of waste (South Sudan Guidelines for Safe Management of Waste)**

| Type of Waste | Description | Colour Code | Requirements |
|---|---|---|---|
| **Medical Waste**<br><br>**(Biohazardous or infectious waste)** | Produced during diagnosis, treatment and medical research | **Yellow plastic bag** | Durable, strong, leakproof plastic bag strong enough to hold the contents (minimum of 0.55 microns) placed inside a solid and sturdy container.<br><br>Mark ''Infectious'' with biohazardous sticker |
| **Sharps** | Part of medical waste and include objects, devices or instruments that are used to puncture, cut or scrape body parts. Sharps can pose a potential hazard as it can puncture or cut, introducing possibly contaminated blood or body fluid. | **Solid yellow container** | Yellow container or other sturdy box<br><br>Clearly marked '''sharps'' and ''biohazardous'' |
| **Biological (Anatomical) Waste** | Includes pathological and biopsy specimens, tissue, organs that were removed during surgery, birth or autopsy. | **Yellow** | Wrap in a plastic bag.<br><br>Place inside a red plastic bag and then into a sturdy container |

| Type of Waste | Description | Colour Code | Requirements |
|---|---|---|---|
| | | | Mark with ''biohazardous" sticker |
| **Cytotoxic waste** | Material that is or has been contaminated with cytotoxic medicines during the preparation, transportation or administration or chemotherapy. Cytotoxic medicine has carcinogenic, mutagenic and/or teratogenic potential and direct contact can cause skin, eye or mucous membrane irritation or ulceration. Waste that has been produced during the chemotherapy process should be separated from other waste at the point of origin and be disposed of in a biohazard bag (red bag) labelled "Chemo". | **Purple** | Strong leakproof container marked ''cytotoxic waste" |
| **Pharmaceutical Waste** | Pharmaceuticals that have (but not limited to) expired their shelf life in the pharmacy or returned by patients. It also includes medicines that no longer comply with the MoH requirements. The disposal of such waste will ONLY be carried out by the pharmacist in-charge of the health facility in line with the guideline issued by the MoH. | Brown | Placed in chemical resistant containers.<br>Marked clearly as hazardous chemicals |

*Table 22: Description of colour codes of different types of waste (South Sudan Guidelines for Safe Management of Waste – Cont.)*

| Type of Waste | Description | Colour Code | Requirements |
|---|---|---|---|
| **Radioactive waste** | Waste (bio-hazardous) that is contaminated with radio- isotopes and is produced during nuclear medicines, radio-immuno assay and bacteriologic procedures.<br><br>Radioactive waste may be solid, liquid or gaseous form. Refer to the Integrated Waste Management Plan (IWMP) 2012. | Place in lead box | Place in lead box and label with a radio-active symbol<br><br>Segregated according to physical form, solid and liquid and according to half-life or potency |
| **E-waste** | Include TVs, electric wires, computers | | |
| **Non-infectious or Non-medical Waste** | Generated during the delivery of healthcare but does not contain any medical waste components. Being non-infectious it is also known as **domestic waste** and poses little or no risk to healthcare staff. | **Black plastic bag** | "Dry waste"<br><br>Non-recyclable |
| **Non-infectious or Non-medical Waste** | Generated during the delivery of healthcare but does not contain any medical waste components. Includes bottles, cans, paper and cartons. | **Clear plastic bag** | If not contaminated with food or other waste<br><br>**Can be recycled.** |
| **Kitchen waste** | Food left over after the day's food distribution has been completed and returns from the wards are sent back to the kitchen. This food cannot be redistributed for consumption and therefore has to be disposed of either as waste. | **Yellow plastic bag** | "Wet waste"<br><br>Kitchen waste |

### 4.2 Requirements for Sharps container

Sharps containers are specifically designed to be visible, robust, and strong to prevent accidental injuries to staff. They are used to discard needles, syringes and other used sharp objects. It is a solid yellow container which is fixed firmly to a surface, within arm's reach of its use. This could be on a procedure trolley, wall mounted or fixed to a flat surface. It should have the following qualities:

- Be made of solid material.
- Be designed to fall away from the body when lifted manually Have robust handles to ensure there is safe handling.
- Have secure lids which do not open once fastened into place.
- Be able to withstand hot water wash up to 90C to maintain cleanliness.
- Not require disinfectants to clean it.
- Not crack or leak during transportation or handling under any circumstances.
- Take the recommended weight and volume of waste.
- Should be replaced at the suppliers cost if damaged or broken.
- Should have clear signage indicating use such as anatomical waste, clinical waste, pharmacy waste, non-clinical waste.

### 4.3 Interim storage of waste

According to the IHCWMP (2012) the proper collection and transportation of HCW is important aspect of waste management. Waste should be transported within a HCF with a wheeled trolley. Healthcare general waste should be temporary stored separately from any other hazardous waste as it is disposed at municipal waste areas.

The area where HCRW are stored should adhere to the following specifications:

- The designated area must be clearly marked.
- Area should be locked and protected from different climatic conditions.
- Waste must be stored in tight containers.
- Impermeable, hard-standing floor with rounded floor of concave edges and good draining.
- Floor should be easy to clean and disinfect if required, with a drainage point on the floor.
- Not accessible to rodents, stray animals and the public or unauthorized personnel.
- Adequate ventilation.
- Proper lighting
- Properly marked with a "No unauthorised entry" sign, as well as a universal sign that signifies "Biohazard".
- Spill kits must be available.

**Figure 9: Examples of signage for storage facilities**

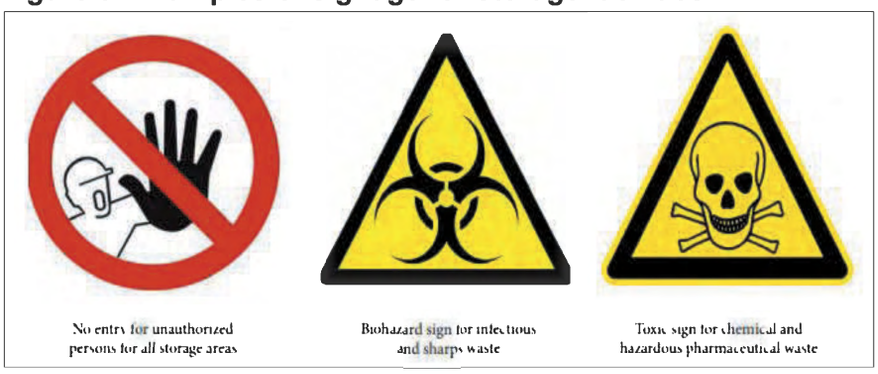



**Table 23** provides a summary of the duration and temperatures for the storage of HCRW prior to disposal and treatment.

**Table 23: Storage period and temperature of HealthCare Risk Waste (HCRW)**

| Waste category | Storage period | Storage temperature |
|---|---|---|
| Pathological waste | 24 hours – 90 days from date of sealing<br><br>Pathological waste not treated with 24 hours shall be stored at -2°C | -2°C |
| Infectious waste | 24 - 72 hours<br><br>Infectious waste not treated within 72 hours shall be stored at -2°C | -2°C |
| Sharps container | 90 days | Cool room temperature |
| Pharmaceutical waste | 90 days | Cool room temperature |
| Hazardous waste | 2 days maximum | 2 ˚C of stored >2 days |
| Non-clinical waste | When stored for longer periods | 5 – 8 ˚C |

**Table 24: Improving healthcare waste management through a multimodal strategy.**

| | |
|---|---|
| System change – build it.<br>*(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)* | • Put in place/improve services to achieve optimum waste management systems, including incineration. This will require budget.<br>▪ Put in place/improve a mechanism to ensure sharps waste containers are easily accessible at the point of use.<br>▪ Make available functional waste disposal containers for infectious and non-infectious waste (bins with plastic bag liner).<br>▪ Put in place an up-to-date policy/standard operating procedure that is targeted at local actions including how access to products can be assured. |
| Training and education – teach it.<br>*(to improve health worker knowledge)* | ▪ Put in place the provision of regular (at least annual) training for all HCWs and waste handlers.<br>▪ Allocate responsibility to check that current training and education programmes include the correct recommendations - map guideline recommendations to training content.<br>▪ Identify the expertise required to conduct training. |
| Monitoring and feedback – check it.<br>*(to assess the problem, drive appropriate change and document practice improvement)* | • Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) on waste management including:<br>o direct observation of HCWs and waste handlers<br>o indirect methods (e.g., observation of waste bags within transport equipment and in storage areas)<br>o availability of waste disposal units at the point of use, as well as reminders in those areas (e.g., posters). |
| Reminders and communication – sell it *(to promote the desired actions, at the right time, including campaigns)* | ▪ Prompt and remind HCWs about the importance of safe segregation of waste in health care areas. Prompt and remind waste handlers about safe practices. |
| Culture and change – live it.<br>*(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)* | • Create an environment and the perceptions that facilitate awareness-raising about patient and health worker safety issues while guaranteeing commitment to all components of health care waste management as a high priority at all levels. |

# Chapter 5: Antiseptics, Disinfectants and Detergent

Disinfectants, detergents and other cleaning materials are chemicals which can potentially be harmful to the users, patients, visitors and the environment. Furthermore, disinfectants share common mechanisms of resistance with antibiotics which increases the risk of AMR especially in healthcare facilities. The role of biofilms is increasingly recognised in encouraging persistence of MDROs and AMR and therefore disinfectants must be limited to essential indications only. Disinfectants must be used specifically when indicated according to SOPs and guidelines of the facility or national guidelines.

## 5.1 Chemicals used for Environmental Cleaning

The aim of cleaning the environment is to remove all visible dirt and dust and to render the surfaces safe by making them clean and dry. Detergents are ideal for routine use in healthcare facilities. Together with the friction of the cleaning action, they can remove 80-90% of all visible dirt from surfaces.

**Detergents**

Detergents are water-soluble cleaning agents that attract dirt and organic matter and are used for cleaning porous and non-porous surfaces. Detergents usually have no killing ability but do remove organic matter which contain microbes and thereby reduce environmental contamination. Most detergents used in healthcare are pH neutral and are specifically designed for use in health facilities. Routine cleaning should be done with clean water and a neutral detergent. The detergents should be compatible with the material they are used to clean.

**Antiseptics**

Antiseptics are chemicals applied to living tissue to reduce the microbial burden on the skin and living tissue, such as pre-operative skin preparation. Antiseptics are indicated for use in the following situations:

- Hand hygiene
- Skin preparation for surgery
- Aseptic procedures

**Types of antiseptics**

The recommended antiseptics for use in HCFs are:

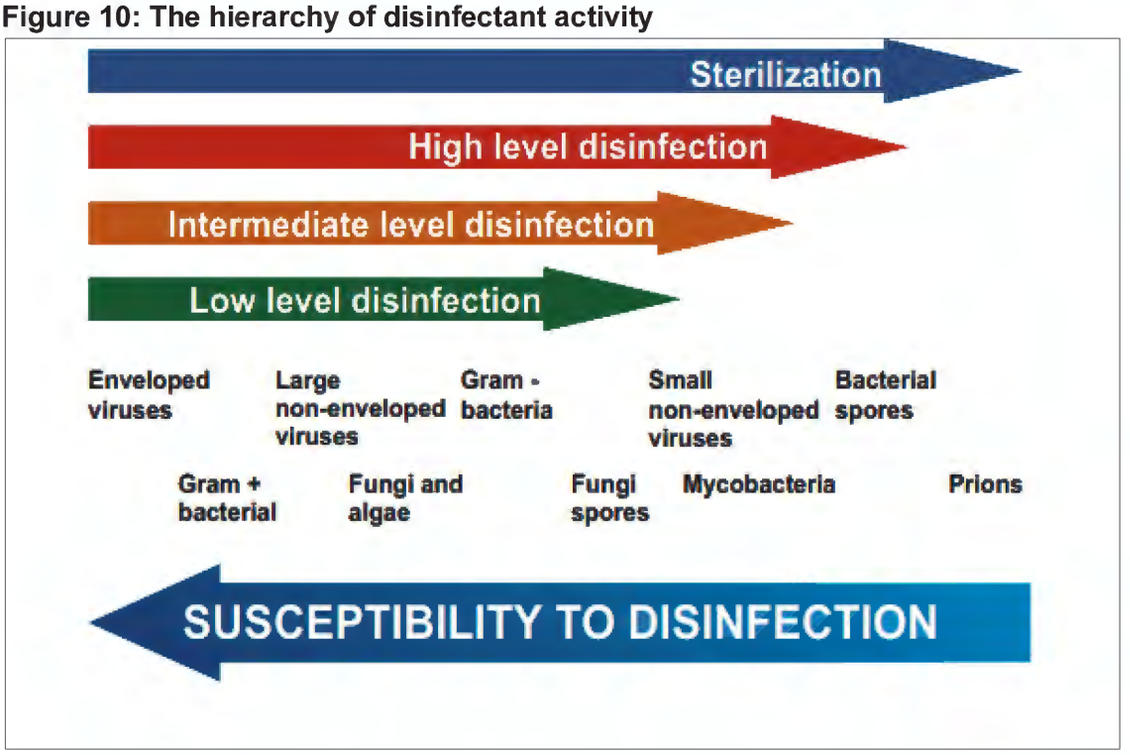
- ***Chlorhexidine:*** 0.5% to 4% w/v; either in water or 70% isopropyl alcohol
- ***Povidone iodine:*** aqueous or in 70% isopropyl alcohol
- ***Alcohol (Isopropyl, propyl, ethanol):*** 60% - 70% with an emollient (glycerol) is recommended as hand sanitizers. (ISO or EN specified concentrations or WHO minimum standards with an emollient is recommended for HH)

**Note: Chemical which are used as antiseptics as well as disinfectant may be harmful to living tissue (except 70% alcohol).**

**Note: Chlorhexidine-containing preparations must not be used for cleaning environmental surfaces because it is expensive, wasteful, and being an antiseptic (and not a disinfectant), it has specific indications for use on skin.**

Disinfectants are used to reduce microbial contamination on surfaces and inanimate objects. Humans must never be sprayed with chemical disinfectants such as chlorine because it is toxic and can cause serious harm to the health worker **Surfaces should be thoroughly cleaned before applying disinfectants** to reduce bioburden and should be used according to the manufacturers' instructions. Disinfectants and detergent-disinfectants (combined) must comply with the indicated standards and special note has to be taken to the disinfecting and cleaning efficacy of detergents, disinfectants, corrosiveness, water insoluble-water matter content and rinsing properties. The hierarchy of antimicrobial activity of the various disinfectants are shown in **Figure 10**

**Figure 10: The hierarchy of disinfectant activity**




**Note: Disinfectants have been implicated in cross resistance with antibiotics, heavy metals and other medication. They promote the acquisition and persistence of HAI pathogens and must be used with great care and at correct dilutions.**

**ALWAYS CLEAN FIRST, THEN DISINFECT**

**Properties of Disinfectants**

**Table 25** provides a list of disinfectants, spectrum of activity, stability and effect on medical devices.

**Table 25: Properties of disinfectants**

| Disinfectant | Spectrum | Stability | Inactivation | Corrosive/ damage |
|---|---|---|---|---|
| Glutaraldehyde | Broad | Moderate | No | No |
| Alcohol | Not spores or | Good | Yes | Lens cement |
| Peracetic acid | Broad | No | No | Slight |
| Chlorine releasing | Broad | No | Yes | Yes |
| Clear phenolics | Not spores or NE Viruses | Yes | No | Slight |
| Quaternary ompounds (QAC) | Poor | Yes | Yes | No |
| Peroxide compounds | Variable | Moderate | Yes | Slight |

***NE= non enveloped viruses**

5.2 Indications for the use of disinfectants in environmental cleaning

Disinfectants should be used after thorough cleaning with clean warm water and detergent to remove all visible dirt. A disinfectant soaked cloth is used to wipe over the surfaces and allowed to be left to dry. Indications for environmental disinfection is as follow:

- Terminal cleaning after TBPs.
- Decontamination of high dependency or isolation units following outbreaks of MDROs.
- Main kitchen surfaces before and after preparing food.
- Operating theatres after excessive blood spillage has been cleaned up and at the end of each day.
- Burns unit, specifically after cleaning the baths after each patient use.
- Sterile fluid and medication preparation areas.
- The routine use of disinfectants in the environment is not recommended for several reasons:
- There is no added benefit of using disinfectants routinely, since good cleaning removes the majority of organic contamination.
- Disinfectants cannot improve more than cleaning on reducing the level of environmental contamination with microbes.
- Disinfectants contribute to increasing resistance to antimicrobial agents among pathogens.

- There are ecological reasons for not overusing disinfectants especially those which are not biodegradable. These accumulate in the waterways and promote antimicrobial resistance.
- They have little or no direct effect on biofilms.
- Disinfectants are expensive.
- Health workers and patients can develop allergies to some disinfectants.

**Note: Any application of a disinfectant must be with a cloth and the surface wiped carefully covering all areas in a systematic technique. It should never be sprayed.**

**Currently, the following disinfectants are recommended for environmental disinfection following thorough cleaning:**

- Chlorine releasing agent – hypochlorite (strength: 1,000-10,000 ppm).
- Alcohol based (70%-90%) agents.
- Quaternary ammonium compounds (QAC) and other chemicals available on the market for use in healthcare.
- Non-touch disinfection technologies such as vaporised hydrogen peroxide and UV disinfection has been introduced to add further disinfection after terminal cleaning following MDRO outbreaks particularly for high dependent and isolation units. **This technology should always be used as an addition to cleaning with a detergent and water; and disinfection, and the technology does not replace these two processes**.

**The IPC Team at the health facility should be consulted for instruction on the choice of disinfectant to use for particular infectious diseases during terminal cleaning.**

Use of disinfectants for reprocessing heat sensitive medical devices - see Section on Decontamination of Medical devices.

Recommendations for Environmental Cleaning

Recommendations for the use of detergents and disinfectants for environmental cleaning stratified by risk are set out in Table 26.

**Table 26: Detergents and disinfectants for environmental cleaning**

| Uses | Agents | Comments |
|---|---|---|
| **Low Risk Areas** | | |
| Corridors<br>All wards<br>Ablution blocks<br>Beds<br>Lockers<br>Floors<br>Surfaces<br>Mattresses | Detergent and clean water. | Use clean, warm water with a neutral detergent.<br>Apply with a clean cloth or mop (floors) until visibly clean, rinse and dry. |
| **High Risk Areas** | | |
| Transplant units<br>Oncology units<br>Operating theatres<br>ICU<br>Neonatal ICU<br>Trauma & Emergency<br>Milk Kitchen<br>Isolation rooms or wards<br>Sluice rooms<br>Mattresses in special units | Clean with detergent and clean water<br>AND<br>Wipe over with hypochlorite disinfectant solution 1:1000 ppm (bleach) or as recommended by IPC Team | Chlorine releasing agents or other disinfectants may be used routinely in high-risk areas.<br>Alternatives should be considered in neonatal units.<br><br>Ensure to adhere to recommended contact times of different disinfectants.<br><br>Consult IPC Team for use in terminal cleaning |
| Stainless steel surfaces, enamel baths and basins | Detergent and clean water<br>OR<br>Ammonia containing detergent where there are fatty deposits | Ensure the product is non- abrasive scratches will retain dirt and bacteria |
| Blood spillages, other infected surfaces or spillages. | Detergent and clean water<br>Chlorine disinfectant (bleach) | • Wear appropriate PPE.<br>• Wipe away spillage with paper towels.<br>• Clean the area with water and detergent and dry.<br>• Wipe over with chlorine 1000ppm solution<br>• Dispose waste and PPE.<br>• Hand hygiene |
| Trolley surfaces | Detergent and clean water<br>AND<br>70% alcohol | Wipe over with alcohol wipe at beginning and end of treatment or wound dressing (ensures dryness |

**Adverse Effect of Disinfectants on Users**

**Table 27** details the advantages and disadvantages of disinfectants as well as the major effects on health worker coming in contact with these chemicals and the impact on the environment

***Table 27: Advantages and Disadvantages of disinfectants***

| | Disinfectant | Advantage | Disadvantage |
|---|---|---|---|
| Low-level disinfectants | *Quaternary ammonium compounds (improved formula) e.g., alkyl dimethyl benzyl ammonium chloride, alkyl dimethyl ethylbenzyl ammonium chloride* | Toxicity:<br>• May be used on food contact surfaces.<br>Wide material compatibility<br>• Non-corrosive<br>Detergent properties, good cleaning ability<br>Low cost | • Toxicity:<br>• Skin irritant<br>• Can also cause respiratory irritation.<br>• Narrow microbiocidal spectrum<br>• Cannot be used to disinfect instruments.<br>• **Diluted solutions may support growth of microorganisms**.<br>• Affected by environmental factors:<br>• Activity reduced by various materials (e.g., cotton, water hardness, microfibre, organic material)<br>• Induces cross resistance with antibiotics.<br>Persists in the environment and waterways. |
| Intermediate-level Disinfectants | *Alcohols (60-80%) e.g., isopropyl, ethyl alcohol, methylated spirits* | • Broad spectrum (but not sporicidal)<br>• Rapid action<br>• Non-toxic<br>• Non-staining, no residue<br>• Non-corrosive<br>• Low cost<br>Good for disinfecting small equipment or devices that can be immersed | • Slow acting against non-enveloped viruses.<br>• Does not remain wet:<br>• Rapid evaporation making contact time compliance difficult (on large environmental surfaces)<br>• Affected by environmental factors:<br>• Inactivated by organic material.<br>• Material compatibility:<br>• May damage materials (plastic tubing, silicone, rubber, deteriorate glues)<br>• Flammable |
| | *Chlorine e.g., bleach/sodium hypochlorite, sodium dichloroisocyanurate (NaDCC)* | • Broad spectrum (sporicidal)<br>• Rapid action<br>• Non-flammable<br>• Low cost<br>• Readily available<br>9. Can reduce biofilms (at | • Affected by environmental factors:<br>• Inactivated by organic material.<br>• High toxicity:<br>• Can release toxic chlorine if mixed with acids or ammonia. |

| | Disinfectant | Advantage | Disadvantage |
|---|---|---|---|
| | | high concentrations) | • Skin and mucous membrane irritant.<br>• Material compatibility:<br>• May damage fabrics, carpets<br>• Corrosive<br>• Leaves a residue, requires rinsing/removal with a clean cloth.<br>• Offensive odours<br>• Poor stability:<br>• Subject to deterioration if exposed to heat and UV. |
| | *Phenolics (Low to intermediate disinfectant)* | • Not inactivated by organic material | • Leaves a residual film on surfaces.<br>• Harmful to the environment<br>• No antiviral activity<br>• Avoid in nurseries (reported hyperbilirubinaemia in infants)<br>• To be avoided |
| High-Level Disinfectant | Glutaraldehyde 2% | Broad range of microbial activity<br>Effectively destroys bacteria, fungi and viruses.<br>• | Takes long to destroy spores.<br>Allergenic<br>Dangerous, toxic and irritant<br>• Maximum exposure time needed |
| | *Hydrogen peroxide (improved formulation) e.g., 0.5% enhanced action formulation hydrogen peroxide, 3% hydrogen peroxide* | • Rapid action<br>• Non-toxic<br>• Detergent properties, good cleaning ability<br>• Not affected by environmental factors<br>• Active in the presence of organic material<br>Safe for environment | • Material compatibility:<br>Contraindicated for use on copper, brass, zinc, aluminium. |
| | Peracetic acid 0.2 to 0.35% | Broad range of microbial activity<br>Poor sporicidal activity<br>Generally rapid<br>• No odour | Expensive<br>Skin and eye irritant<br>Unstable when activated.<br>Stains items and skin if not thoroughly removed.<br>Hypersensitivity reactions<br>• Monitor for efficacy levels |
| | Peroxide compounds (7.5%) | Cold sterilisation of heat sensitive items<br>No activation<br>No odour<br>• Ecofriendly | • Material compatibility concerns with metals such as brass, copper, zinc, etc |

**Dilution of hypochlorite solution**

Hypochlorite is commonly used in HCFs. It must be used at the correct dilution to ensure maximum efficacy and a fresh solution must be re-constituted daily. Hypochlorite (chlorine) must be used at the correct dilution to ensure maximum efficacy. See **Table 28** and **Appendix 8** (illustrations) for instructions on how to re-constitute hypochlorite and the application of the different strengths in HCFs.

**Note: Chlorine solution becomes unstable rapidly. It must be freshly prepared daily. Chlorine is corrosive and must be used sparingly and all equipment must be rinsed off after its use.**

***Table 28: Instructions to reconstitute hypochlorite.***

| Product | 2% Solution | 1% Solution | 0.2% Solution | 0.05% Solution |
|---|---|---|---|---|
| **Calcium Hypochlorite (HTH)**<br>*At 70% active chlorine* | 30 grams in 1 litre of water or 2 level soupspoons in 1 litre of water | 15 grams in 1 litre of water or 1 level soupspoons in 1 litres of water | 3 grams in 1 litre of water or 2 level soupspoons in 10 litres of water | 0.7 grams in 1 litre of water or<br>0.5 soupspoon in 10<br>litres of water |
| **NaDCC**<br>*At 1g active chlorine per tablet* | 20 tablets in 1 litre of water | 10 tablets in 1 litre of water | 2 tablets in 1 litre of water | 5 tablets in 10 litres of water |
| **Chlorinated lime**<br>*At 30% active chlorine* | 60 grams in 1 litre of water or 4 level soupspoons in 1<br>litre | 33 grams in 1 litre of water or 2 level soupspoons in 1 litre | 6 grams in 1 litre of water or 4 level soupspoons in 10 litres | 1.5 gram in 1 litre of water or 1 level soupspoon in 10<br>litres |
| **Sodium hypochlorite**<br>(bleach)<br>*At 5% active chlorine* | 400 ml of bleach in<br>1 litre of water | 250 ml of bleach in 1 litre of water | 40 ml of bleach in 1 litre of water | 10 ml of bleach in 1 litre of water |

| Product | 2% Solution | 1% Solution | 0.2% Solution | 0.05% Solution |
|---|---|---|---|---|
| **Sodium hypochlorite concentrate**<br>*At 15% active chlorine* | 166 ml of concentrate in 1 litre of water | 70 ml of concentrate in 1 litre of water | 16 ml of concentrate in<br>1 litre of water | 3.3 ml of<br>concentrate in 1 litre of water |

**Note:** Never prepare chlorine solutions in metallic containers (unless they are properly enamelled or painted) or use metallic spoons for measurement or stirring purposes

HTH loses about 2% of active chlorine per year. NaDCC is the most stable product. The remaining three products are unstable and should be used within three months of being manufactured (if stored in good conditions)

**Table 29** provides information about the indications for the use of different strengths of chlorine solution.

**Table 29: Indications for the use and strength of hypochlorite**

| Indication for chlorine use | Available parts per million (ppm) of free chlorine |
|---|---|
| Blood spillage (HIV, HBV, HCV) | 10,000 ppm |
| Pre-cleaned surfaces, cleaning equipment | 1000 ppm |
| Catering and infant feed equipment | 125 ppm |
| Hydrotherapy pools | 4-6 ppm |
| Drinking water | 0.5-1.0 ppm |
| Cholera | 1000 ppm (depending on the activity) |
| VHF | 1000 ppm (depending on the activity) |

The following link provides access to a chlorine dilution calculator:
https://www.publichealthontario.ca/en/health-topics/environmental-occupational-health/water-quality/chlorine-dilution-calculator

The chlorine strength and contact time can differ based on the disease and the activity.

**Table 30** provides more examples of different strengths of chorine, the use and recommended contact time.

***Table 30: Chlorine strength, use and contact time***

| | Chlorine Strength | Use | Contact time |
|---|---|---|---|
| Routine | 0.05% | Linen | 30 minutes |
| | 0.1% | Surfaces | 10 minutes |
| | | PPE | 10 minutes |
| | 1.0% | Blood/body fluid spills | 10 minutes |
| Context of Ebola and other VHFs | 0.05% | Linen, PPE | 30 minutes |
| | 0.5% | Environmental surfaces, PPE, blood and body fluid spills | Minimum 10 minutes |

**Note: All chemicals must include the manufacturer's instruction for dilution**

Choice of Disinfectants

The following should be considered when disinfectants are selected:

- Indication for use (e.g., environmental cleaning vs haemodialysis equipment)
- Active ingredients
- Health warnings
- Biological activity/product claim
- Manufacture date
- Quantity
- Disinfectant should be bactericidal rather than bacteriostatic and active against a wide range of micro-organisms.
- The chosen disinfectants should be considered in terms of acceptability, availability, cost, as well as antibacterial activity.
- Stability, toxicity, corrosiveness, and cleaning properties should be assessed before use.
- It is essential to monitor the effectiveness of disinfectants e.g., by regular "in-use" tests under actual conditions of use on the wards.

## 5.4 Important points about Disinfectants

The following should be adhered to:

- Follow manufacturer's instructions **AND** ensure that the correct (optimum) dilution is used.
- Check expiry date of the solution. The date should be clearly marked on the container.

- Disinfectant containers must be thoroughly cleaned or sterilized before refill between uses. **NEVER TOP UP!!**
- Disinfectants must **not** be used to disinfect invasive devices e.g., endoscopes.
- Disinfectants should be supplied, preferably ready for use from the pharmacy (new stocks to be supplied on receipt of empty containers). Do not discard empty containers or use them to store other solutions. Chemicals can be harmful when used in the wrong situations.
- Open containers of disinfectant should **not** be tolerated in any HCF. There is a serious risk of contamination with multiple antibiotic-resistant bacteria such as Pseudomonas species.
- Where disinfectants are indicated for use on surfaces, WIPE! Do not wash, bathe or flood wash.

**Always thoroughly clean and then disinfect any article or surface**

**Table 31: Recommendations for decontamination of patient care articles**

| Items or site | Preferred method | Alternative methods/ comments |
|---|---|---|
| **ALL ITEMS SENT FOR DISINFECTION OR STERILISATION MUST BE THOROUGHLY CLEANED PRIOR TO PROCESSING. This will be done at CSSD.**<br>**and not at ward level.** | | |
| Airways and endotracheal tubes[1] | Single use, OR Heat disinfection at 80° C | Use disposable for airborne diseases if heat sterilization not available. |
| Ambubags[1] | Send to CSSD for heat disinfection | Ethylene oxide. Do not soak in a disinfectant such as Glutaraldehyde. |
| Ampoules | Wipe with 70% isopropyl alcohol and allow to dry before opening. | DO NOT immerse in disinfectant. |
| Bath water | NO addition of antiseptic routinely unless burns patient. | Antiseptics become colonized with gram negative bacilli. |
| Baths | Clean with detergent and non-abrasive cream cleanser. Rinse and dry. | Infected patients. As previous column. Wipe over with chlorine-based agent after cleaning. Do not soak. |
| Bed and cots | Wipe with warm water and detergent to remove all visible signs of dust and dirty. Dry | Ensure the cot is dry after cleaning and before putting back the mattress. |
| Bed frames | Wipe with warm water and detergent. Dry | NO disinfectants required routinely |
| Bed locker | Wipe with warm water and detergent. Dry.<br>Clean inside locker once patient has been discharged | NO disinfectants required routinely |
| Bedpans and urinals | Wear nonsterile gloves.<br>Empty contents directly into Ward washer disinfector (80°C x1 min). Inspect for cleanliness after removal. Clean if necessary and store inverted to dry. | Macerators with paper maché bedpans and urinals. *Manual cleaning*: wear gloves. Empty BP into sluice and rinse. Clean bedpans thoroughly with a nylon scrubbing brush and detergent. Rinse. Invert to dry |

| Items or site | Preferred method | Alternative methods/ comments |
|---|---|---|
| | | NEVER SOAK BEDPANS. |
| Blankets and bed covers | Changed after each patient has been discharged or when visibly soiled. Send to laundry to wash at 80°C. | Do not allow bedding from home; these may be infected with bedbugs or carry scabies. |
| Bowls (dressing, surgical) | Return to CSSD. | Disposable. If washed on the ward, clean thoroughly and dry. |
| Bowls (patient wash) | Wash with detergent, rinse and store inverted to dry. | Modern ward washer disinfectors can also wash bowls.<br>Use fresh water and towels for each patient. |
| Carpets | Daily vacuum (vacuum cleaner fitted with a filter). Shampoo periodically and extract with vacuum cleaner | Not recommended in clinical areas. |
| Commodes | Wash seat daily with detergent and hot water and dry with a disposable paper towel.<br>Wipe the commode seat with a large alcohol wipe after each use. | If visibly contaminated, remove soil with tissue. Wash with warm water and detergent. Dry.<br>Enteric disease - Wipe the commode with hypochlorite (1000 ppm av $Cl_2$). After each use. |
| Computer and keyboards | Damp dust daily.<br>Wipe keyboard carefully to remove visible dirt. | Use a keyboard cover which is changed frequently. |
| Crockery and cutlery | Wash at 80°C in dishwasher<br>*Manual Cleaning*: wear gloves and hand wash in detergent and hot water (60°C), rinse and dry. | Wear domestic gloves for manual cleaning.<br>*Infected patients*: unless instructed by IPC Team<br>treat as routine. Disposable crockery is rarely indicated. |
| Curtains | Change curtains routinely every 4 weeks. | Blinds, both vertical and horizontal are difficult to clean and wash regularly and gather dust. These |

| Items or site | Preferred method | Alternative methods/ comments |
|---|---|---|
| | Isolation room curtains (infectious cases) should be changed with each terminal clean unless visibly soil. | should not be used in ward areas. |
| Drains | Clean regularly and keep free flowing | Chemical disinfectants are not recommended. |
| Dressing trolleys* | Remove all items daily and wipe surface with warm water and detergent. Dry. Wipe over with 70-80% ethanol alcohol. Discard all previous contents of open jars and bottles. Replace by unopened containers. | If open jars are used, keep the volume small so that the containers can be heat disinfected when empty.<br>DO NOT TOP UP OPEN DISINFECTANT CONTAINERS. |
| Duvets | Water impermeable cover should be used and changed after each patient | Dry clean or launder after each patient use. |
| Endo-tracheal suction catheters | Disposable- can be used for 24 hours on the same patient. Flush with sterile water after each use. Bowl is washed and dried after each suction and filled with sterile water only before use. | Decontaminate hands thoroughly before carrying out suction. Do not share suction catheters between patients. DO NOT RECYCLE SUCTION<br>CATHETERS. |
| Feeding bottles (baby) | Heat sterilized in CSSD | Wash thoroughly. Rinse and soak in a fresh hypochlorite solution (125 ppm available chlorine) x 30 min. Remove, rinse and dry. |
| Floor cleaning: Dry and wet | Dust attracting mop Water and detergent only | Sweeping not recommended. Disinfectants not recommended. |
| Humidifiers[1] | Empty daily and heat disinfect after each patient use. Clean with warm water and detergent. Dry. Fill with sterile water only. | Not recommended. Use heat exchange filters. |
| Infant incubators | Wash all removable parts and clean thoroughly with detergent. Dry with paper towel. | *Infected:* after cleaning, wipe over with 70% ethanol alcohol or hypochlorite (125ppm av $Cl_2$). Leave incubator to stand unused for 6 hours (aeration) |
| Instruments (surgical) | To CSSD | |
| Kitchen cloths | Daily: wash in detergent and dry | Disposable preferable. |

| Items or site | Preferred method | Alternative methods/ comments |
|---|---|---|
| Lamps, examination | Wipe with damp cloth daily | Remove all visible blood and body fluid stains. |
| Laryngoscope blade | Wash with detergent, rinse and dry. Wipe over with alcohol | Removable heat stable blades with detachable bulbs recommended and send to CSSD. |
| Linen | Automated methods preferred | See chapter on linen management. |
| Mattresses | Use a water impermeable cover. Clean with warm water and detergent. Dry thoroughly.<br>Never use soiled, stained or damaged mattress.<br>If rubber covers are uncomfortable, cover with absorbable paper which is frequently changed. | Major source of cross infection<br>Ideally mattresses should have two covers- the bottom one should be impermeable and the top one should be removable and washable.<br>Replace torn mattress covers immediately. Soggy mattresses should be discarded. |
| Mop bucket | Daily: wash in warm water and detergent and store inverted to dry. | Do not use chemical disinfectants. |
| Mops | Daily: detachable head sent to laundry, for heat disinfection and dried.<br>Manual cleaning: Wear rubber gloves. Rinse thoroughly under<br>running water. Wash in hot water and detergent until clean. Store inverted to dry. | Colour coding of mops is useful to reduce cross contamination between clean and dirty areas and infectious isolation rooms.<br>The sun can be used in warm countries. |
| Nail brushes | Not recommended - surgical sponges preferred for surgical scrub | Single use and heat disinfection only. |
| Nasogastric (feeding) tubes | Disposable | Cannot be recycled. |
| Nebulizers[1] | Wash and dry the container and mask after each patient use. Store dry and protected from dust. | |

| Items or site | Preferred method | Alternative methods/ comments |
|---|---|---|
| Oxygen masks[1] | Disposable | If reusable: wash thoroughly until visibly clean or use heat disinfection (CSSD). Dry.<br>OR Wipe with alcohol. Discard when damaged |
| Patient toilet articles | Patients should bring their own soap, towels, shaving equipment and other personal items which should never be shared. | Razors and sharp items should never be shared between patients. |
| Pillows | Use waterproof cover. | See section on mattresses |
| Rectal thermometer | Wash in detergent after each use. Wipe with alcohol and store dry. | |
| Scissors | Wipe over with 70% alcohol before and after each use. Store dry. | |
| Scrubbing machine | Drain reservoir after use; Clean thoroughly and wipe with a damp cloth and store dry. | If done manually, use warm water and detergent only. Polish remover may be used. Wash brush and bucket and dry after use. |
| Shaving brushes | Not recommended. | Pre-operative hair clipping should only occur in the operating suite-never on the ward.<br>Shaving is not recommended. |
| Sheepskin | Synthetic: laundry<br>Natural; wash in detergent and dry. | Not recommended for routine use unless clinically indicated. Restrict to one patient use only. |
| Soap (hand washing) | Tablet: store dry<br>Liquid: wall mounted dispenser containers. Single use sachets. OR | Tablet soaps are not recommended.<br>NEVER TOP UP DISPENSER it increases risk of GNB colonisation increases. |

| Items or site | Preferred method | Alternative methods/ comments |
|---|---|---|
| | Must be sent for thorough cleaning and heat disinfection if recycled and refilled under aseptic conditions. | |
| Shower head | Should be removed and cleaned thoroughly each week. Soak in descaler if necessary | Replace rubber washer with plastic ones to prevent legionnaire's disease. |
| Specimen and sputum containers | Disposable only. | Get false laboratory results if recycled. |
| Suction machines | Empty the reservoir in the sluice after use, wash with warm water and detergent and store dry.<br>Disposable preferred. OR Send tubing to CSSD for sterilization. Clean the surface and cover after each use. | PPE – non- sterile gloves and apron<br>Never leave fluid (secretions or disinfectant) in the reservoir if not in use. |
| Surfaces and ledges | Damp dusting daily. Dry. | |
| Thermometer (oral)<br><br>Electronic | Wash and dry after each patient use. Wipe with 70% alcohol and store dry.<br>Change sleeve after each use. | NEVER soak thermometers in disinfectants. Never use without sleeve. |
| Taps | Elbow operated OR automatic no touch system. Clean daily and keep dry. | Replace rubber with plastic washers to prevent Legionnaire's disease.<br>If two taps, allow to run while drying hands. Use paper towel to turn the tap off. |
| Toilet seats | Wash at least daily with detergent and dry. | |
| Tooth mugs | Disposable or send to CSSD between patients | |
| Toys | Soft: machine wash, rinse and dry. | Do not share toys in an infected ward. Heavily soiled toys may have to be destroyed. |

| Items or site | Preferred method | Alternative methods/ comments |
|---|---|---|
| | Other: wash with detergent rinse and dry. Wipe with alcohol. | |
| Respiratory tubing[1] | Disposable.<br>Reprocessed in CSSD. | NEVER use Glutaraldehyde to disinfect respiratory equipment. |
| Ultrasound probe | Disinfect with 70% isopropyl alcohol between each patient use. Intra-vaginal: cover probe with a condom for each patient. | |
| Ventilators- machines | These are complex and should be cleaned and disinfected according to manufacturer's instruction.<br>Sometimes there are technicians in the HCF who do the maintenance.<br>These persons should be trained. | Remove tubing and send for heat disinfection to CSSD (80°C x 3 min) or ETO.<br>Clean all connections. Change both sets of filters.<br>Check efficiency of air movement. Reassemble.<br>Clean the outside of ventilator Register in logbook. |
| Wash basins | Clean with warm water and detergent, cream cleaner for stains. | Disinfectants not recommended. |
| Wound suction (closed drainage) | Remove lid and carefully remove inner liner containing fluid. Dispose of in infectious waste container or sluice.<br>Wash and clean the outer cover, dry and replace bag. Check the<br>valves and connectors are clean and functioning. | Send for heat disinfection after each patient use. |
| X-Ray equipment | Damp dust only.<br>Wipe X-Ray film holders with alcohol between each patient. | Wipe with 70% alcohol if disinfection required. |

| Items or site | Preferred method | Alternative methods/ comments |
|---|---|---|
| *Open containers are a high-risk area for transmission from hands of staff and contamination from the environment and should be avoided<br><br>[1] Respiratory equipment ideally should be disposable (risk of TB). If reused, then ensure the items are sent to the CSSD for automated processing and heat disinfection. Soaking of respiratory equipment at ward level is unacceptable.<br><br>[2] Ventilators should be protected with internal and external filters and cleaned after patient use. | | |

# Chapter 6: Decontamination of patient care articles

This section addresses the decontamination of medical devices, including routinely used items of equipment both clinical and non- clinical. The term medical device refers to an article, instrument or piece of equipment that is used in the prevention, diagnosis or treatment of illness or disease, or for detecting, measuring, restoring, correcting, or modifying the structure or function of the body for some health purpose.

If incorrectly processed medical devices can contribute extensively to HAI pathogen transmission, especially multidrug resistant Gram-negative bacilli and can lead to outbreaks.

- Clean medical devices thoroughly until visibly clean and ensure that it is dry.
- Disinfection using heat is preferred to chemical disinfection, depending on the manufacturer' guidelines.
- Store clean and dry until further use - make sure there is no recontamination such as splashes in the sluice area.

Note: When purchasing medical devices, ensure that the items can be heat disinfected. Always consult the manufacturer's instructions for decontamination methods. Always ensure that the Material Safety Data Sheet (MSDS) is available in the event of exposure incidents.

**Decontamination of medical devices**

Decontamination is a general term used to describe processes that include cleaning, disinfection, and sterilisation.

**Level of decontamination**

The WHO Decontamination Guideline (2016) clearly outlines and emphasises the need for optimal cleaning, disinfection and sterilization of reprocessed medical devices that are used for patient care. **Table 32** provides an overview of the levels of decontamination and description of each.

**Table 32: Level of decontamination**

| Level of decontamination | Description of decontamination |
|---|---|
| Cleaning | Cleaning refers to the physical removal of body fluids, tissue, dust or foreign material. It will reduce the number of microorganisms as well as the dirt, thereby improving contact with the surface being disinfected or sterilized, reducing the risk of dirt being fixed to the surface. Removal of dirt will also limit the risk of inactivation of a chemical disinfectant and the multiplication of microorganisms. Cleaning is the removal of contamination from an item to the extent necessary for further processing or for intended use. |
| Disinfection | Disinfection refers to the destruction or removal of microorganisms at a level that is not harmful and renders the item safe to handle by health workers. This process does not necessarily include the destruction of bacterial spores. |
| Sterilisation | Sterilization refers to a validated process that renders a medical device free from microorganisms. It is the complete destruction or removal of microorganisms, including bacterial spores. |

### 6.1 Spaulding's Classification

Spaulding's classification categorises medical devices into three categories (critical, semi-critical and non-critical), based on the risk of infection to the patient **(Table 33)**.

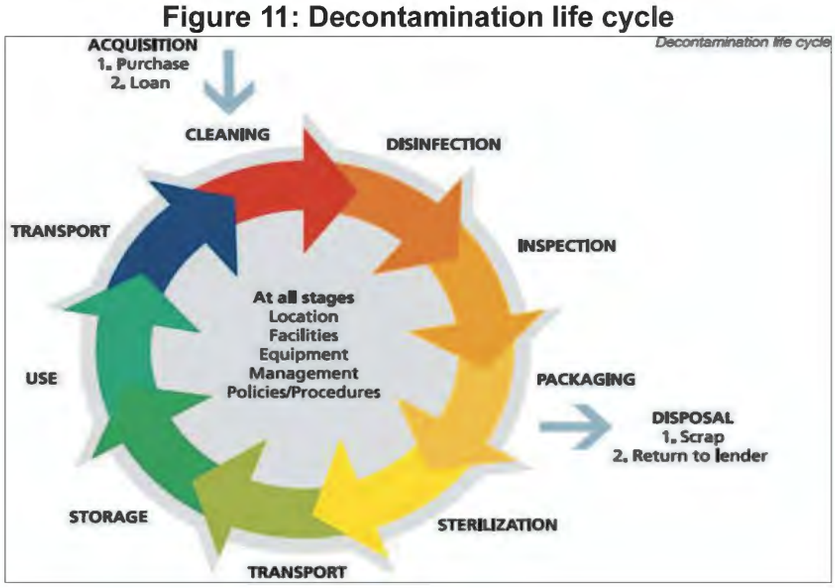
***Table 33: Spaulding's classification***

| Risk Classification | Category | Type of decontamination required |
|---|---|---|
| Critical high risk | Critical | Any re-usable medical device (such as surgical instruments, rigid endoscopes) used to enter a sterile body cavity (e.g., abdominal cavity, cranium, joint cavity) will require sterilization either by steam (if heat stable) or by chemical means (if heat sensitive). |
| Semi-critical medium risk | Semi-critical | Medical devices that come into contact with non-intact skin and mucous membranes require high level disinfection and seldom, sterilization. Examples include endoscopes (gastroscopes, bronchoscopes) and respiratory devices. |
| Non-critical low risk | Non-critical | Devices that come into contact with intact skin, environmental surfaces or other areas which pose a low risk will require thorough cleaning and drying, with low level disinfection if indicated. Examples include blood pressure machine cuffs, stethoscopes and thermometers. |

### 6.2 The Decontamination Life cycle

The decontamination life cycle illustrates the important steps of the decontamination process, with each step as important as the next step **(Figure 11 ).** The cycle starts when dirty medical devices are brought to the CSSD, then cleaned, disinfected, inspected, packed, sterilized, transported, stored, used and transported back to the CSSD.

**Figure 11: Decontamination life cycle**



**If in doubt regarding reprocessing of a medical device, consult the manufacturer or the IPC Team.**

**Note: Single use devices may not be re-processed routinely. If essential to reprocess such devices, consult the manufacturer.**

A summary of the steps to improve cleaning and decontamination are outlined below:

**Pre-clean**

All surgical instruments and medical devices should be wiped with a cloth or rinsed off in cold water prior to sending them for decontamination. The removal of course debris, blood and tissue allow for safer transportation and better cleaning the central sterile services department (CSSD). The medical devices should be placed in a sealed container, where they can remain moist, until collection. Dried on organic matter is difficult to remove and should be avoided.

**Transporting used medical devices**

Medical devices must be transported in a secure container to the CSSD to prevent spillage and contamination of health workers and the environment.

**Receiving instruments in the Dirty Area**

All medical devices should be sent to the Decontamination Unit or CSSD for reprocessing. These are received in the dirty area of the unit, checked and logged. The appropriate method of cleaning, either manual or automatic, is documented. The medical devices are opened or dissembled and laid out for cleaning.

**Cleaning of Medical Devices**

Thorough cleaning of all medical devices is essential to remove organic matter and biofilm. The presence of any organic matter will impact on the disinfection and sterilization. It is essential that the appropriate method and cleaning agents are used during reprocessing.

**Long tubes with narrow lumens, such as suction catheters or nasal prongs, cannot be cleaned and therefore cannot be sterilized.**

**It is pointless to soak narrow lumen tubing in a disinfectant since these solutions cannot penetrate the biofilm formed inside the lumen**. The safety of the medical device cannot be guaranteed and therefore should not be considered. It is more cost effective to provide single use tubing for patients. Single use items also contribute to the reduction of HAIs.

**Table 34: Cleaning agents and general recommendations**

| Method | Agents | General recommendations |
|---|---|---|
| Manual cleaning | Detergent and water<br>Enzymatic cleaner | • Clean instruments immediately after use (PPE for health worker).<br>• Two sinks, one for washing and one for rinsing.<br>• Follow manufacturer instructions.<br>• Open hinged/jointed instruments to ensure access.<br>• Disassemble instruments before cleaning.<br>• Use only suitable cleaning tools and accessories (cloths, brushes).<br>• Clean below water level to prevent splashing. |
| Automated cleaning<br>• Washer disinfector<br>• Ultrasonic | Detergent and water<br>Enzymatic cleaner | • Load washer disinfector with open/disassembled instruments.<br>• Low temperature first wash <35°C<br>• Main wash > 55°C<br>• Disinfection rinse (71°C for 3 min or 80°C for 1min)<br>• Final cold rinse<br>• Ultrasonic for hollow bore instruments |

**Inspection Assembly and Packaging**

Once washed, the clean items are safe to handle. The staff will inspect each medical device to ensure it is fit for purpose. If not, the item must be sent for repairs or be replaced in the surgical tray. If any debris is found, the medical device must be returned for another round of cleaning. Once found to be clean and fit for purpose, the medical devices are assembled and placed in an appropriate container or packaging.

If steam is the method of sterilization, the packaging must allow steam to penetrate throughout its contents during the process. The sterilizer must be packed systematically to allow maximum steam penetration into all areas of the packaging.

## 6.3 Sterilization

There are several methods of sterilization **(Table 35)** but the cheapest and most often used is steam (moist heat). High temperature steam under pressure is used for sterilization of medical supplies in HCFs. An autoclave kills micro-organisms at high temperatures with steam (sterilization). The autoclave removes the air from within the chamber, which will be replaced by saturated steam. On contact with the objects inside the chamber, latent heat is released which kills microorganisms including spores. Each reprocessing cycle is monitored using physical and chemical indicators to ensure the contents have been processed according to given standards.

Sterilization temperatures commonly used for medical devices and fluids:

- 121°C for 15 minutes
- 134°C for 3 minutes

**Table 35: Methods of Sterilization**

| Method | Type |
|---|---|
| Heat | • Flaming<br>• Incineration<br>• Steam under pressure<br>• High-temperature water (>100°C)<br>• Dry heat |
| Poisoning by gases and chemicals | • Ethylene Oxide<br>• Combination of formaldehyde and steam<br>• Glutaraldehyde |

**Post sterilization**

After the cycle has been completed the contents are removed, and stored in a dry, well-ventilated area awaiting dispatch to the clinical areas

## 6.4 Decontamination using disinfectants.

Heat sensitive items, like endoscopes, cannot be sterilized by steam or heat and therefore require cleaning and reprocessing with chemical disinfectants. Several disinfectants are available on the market that provide **high level disinfection. Table 36** provides a summary of the properties, antimicrobial activity and toxic effect of some of the disinfectants available on the market.

It must be noted that because these are toxic substances, meticulous care in wearing of PPE, good ventilation and learning the correct method and in use dilutions are important for staff handling such chemicals.

Endoscopes are complex medical devices with several channels, each of which has to be cleaned and disinfected thoroughly. Several outbreaks of infections have been recorded relating to both endo and bronchoscopes. The person carrying out the reprocessing must be well trained and supervised if necessary. Records must be kept of reprocessing for each item must be kept. Once reprocessed and decontaminated, the items must be safely stored to avoid damage.

It is further important that the MSDS is available in the event of any exposure or adverse effect of staff being exposed to disinfectants.

**Table 36: Disinfectants: properties, antimicrobial activity and toxic effect**

| Disinfectant | Spectrum | Stability | Inacti-vation | Corrosive/ damaging | Health worker | Environment |
|---|---|---|---|---|---|---|
| Orthophthalal-dehyde | Broad | Moderate | No | No | Toxic/ Irritant | Irritating/ sensitising |
| Alcohol | Not spores or non-enveloped viruses | Good | Yes | Lens cement | Toxic/ Irritant | Corrosive |
| Peracetic acid | Broad | No | No | Slight | Slight irritant | Fire hazard, corrosive |
| Peroxide compounds | Variable | Moderate | Yes | Slight | Not very toxic | 90% bio-de-gradable |

| Disinfectant | Spectrum | Stability | Inacti-vation | Corrosive/ damaging | Health worker | Environment |
|---|---|---|---|---|---|---|
| Not recommended for medical devices | | | | | | |
| Chlorine releasing agents | Broad | No | Yes | Yes | Irritant | Not bio-de-gradable |
| Clear phenolics | Not spores or non-enveloped (NE) viruses | Yes | No | Slight | Poisonous | Not bio-de-gradable |
| **Quaternary ammonium compounds (QAC)** | **Poor** | **Yes** | **Yes** | **No** | **Low toxicity** | **Damages cement, rubber** |

**Important points**

- All reusable medical devices must be reprocessed in a CSSD or Decontamination Unit. No cleaning or packaging of medical devices should take place in clinical areas.
- Workflow is from dirty to clean with no crossover of staff or equipment.
- Have separate areas for cleaning, inspection/assembly and packaging, sterilization and storage which do not allow recontamination of sterile items.
- Ensure that there is good ventilation to reduce transmission and for the comfort of staff.
- Facilities for hand hygiene must be available in the different areas.
- A gowning area with appropriate PPE must be available.
- Ensure the equipment used for decontamination and sterilization is functional, the processes are validated (with records) and is regularly maintained (with logbooks).
- Medical devices should be rinsed or wiped to remove gross soiling at point of use.
- Sterile storage area must be airy, bright, and dry with ambient temperatures not exceeding 27˚C.
- All health workers handling used medical devices must be vaccinated against hepatitis B, have proper PPE and be trained in applicable decontamination processes. See chapter on PPE.

**Manual Cleaning outside the CSSD**

- All health workers responsible for the cleaning of medical devices should wear appropriate PPE (See section on PPE).
- Always hold the item under the level of the water to minimize splashes. Avoid running water which can create splashes and aerosols.
- Clean items with a soft brush, brushing carefully, if applicable
- Examine the item to ensure it is visibly clean.
- Rinse and dry thoroughly before disinfection or patient use, depending on the manufacturers' guideline.

**Note: All items (medical devices) must be clean and dry before being used on a patient. When procuring items, a heat disinfection method is preferred.**

**Note: During an outbreak, all patient care articles should be disinfected with heat or a compatible chemical disinfectant to ensure that no transmission takes place.**

**Refer to Table 33** for an overview of the decontamination required for different types of medical devices

# Chapter 7: Transmission Based Precautions

## Contact, Droplet, and Airborne precautions

*Key practice points:*

- Use TBPs in addition to Standard Precautions for patients with known or suspected infections.
- Assign the type of TBPs to a patient depending on the transmission route of the microorganism: contact, droplet, or airborne.
- Use more than one type of TBP as appropriate as some diseases are spread in more than one way.
- Identify those patients with infections that require any type of TBP; this is critical and this is achieved through timely effective triage and assessment following routine surveillance.
- For all patients on TBPs consider: 1) appropriate patient placement; 2) appropriate use of personal protective equipment, including gloves and gowns; (3) limiting transport and movement of patients; (4) use of disposable or dedicated patient care equipment; and (5) prioritizing cleaning and disinfection of patient rooms. Requirements differ according to contact precautions, droplet precautions or airborne precautions and are summarized in the tables in this chapter.
- Focus on a combination of a supportive infrastructure, the use of reminders (e.g., posters), training and education (consistent with guideline content), monitoring and evaluation (using a valid and reliable approach) and a safety culture, to make it more likely that TPBs will be applied.

### why TBPs are needed?

- Standard Precautions are applied to the care of all patients in all healthcare settings, regardless of the suspected or confirmed presence of an infectious agent. Refer to chapter 3, Standard Precautions.
- TBPs are additional measures for patients who are known or suspected to be infected or colonized with infectious agents, including certain epidemiologically important pathogens, which require additional control measures to effectively prevent transmission. They are grouped into categories according to how the infection is spread (i.e., the mode of transmission of the infectious agent), the three categories are: i) Contact, ii) Droplet and iii) Airborne.
- They are based on suspected (i.e., according to signs and symptoms) or differential diagnosis of known (diagnosis or lab confirmed) infection or colonization.
- For some diseases that have multiple routes of transmission (e.g., SARS), more than one TBPs category may be used.

### When and how to apply TBPs?

- TBPs should be applied when caring for patients with known infection, patients who are colonized with an infectious organism, and asymptomatic patients who are suspected of/under investigation for colonization or infection with an infectious microorganism.
- The three categories of TBPs each have their own specific recommendations. See: Tables Contact Precautions, Droplet Precautions and Airborne Precautions at the end of this chapter for these recommendations. However, there are some general considerations common to all including: patient identification and triage and the use of signage.

**Patient identification – the importance of timely effective triage**

- Clinical triage is used to identify whether patients might need to be placed on TBPs and should occur: when a patient first arrives at a healthcare facility and whenever a patient develops new signs or symptoms during hospitalization.
- There should be designated isolation space and a plan for reporting to public health authorities.
- TBPs should be implemented immediately if triage identifies that a patient has a suspected or known infection that cannot be stopped by Standard Precautions alone.
- If available, conduct laboratory testing to confirm the microorganism responsible for infection.
- The individual responsible should refer to annexe 12 (Clinical Syndromes/Conditions Warranting Empiric TBPs in addition to Standard Precautions) and Table 19 (Summary of IPC precautions for Standard, Contact, Droplet and airborne transmission) during triage to help determine the precautions to be employed.

**Table 37: Summary of IPC precautions for standard, contact, droplet and airborne Transmission**

| Activity | STANDARD PRECAUTIONS | CONTACT TRANSMISSION | DROPLET TRANSMISSION | AIRBORNE TRANSMISSION |
|---|---|---|---|---|
| **Triage and patient placement** | Single room not required | Single room and minimize time outside | Single room.<br>Minimize time outside the isolation room, and when the patient should wear surgical mask.<br>Provide at least 1 metre (>3 feet) of separation between patients in the cohort if possible | Single well-ventilated room (ideally with negative pressure ventilation).<br>Minimize time outside isolation room and patient may wear surgical mask.<br>Exclude non-essential susceptible people |
| **Hand hygiene according to Five Moments** | Yes | Yes | Yes | Yes |
| **Gloves** | When likely to touch blood, body fluids and contaminated items | Wear gloves on entering room to provide patient care (i.e., when contact/touching is likely with patient and their blood, body fluids and contaminated items and equipment) | Use risk assessment judgment as per *Standard Precautions* | Use risk assessment judgment as per *Standard Precautions* |

| Activity | STANDARD PRECAUTIONS | CONTACT TRANSMISSION | DROPLET TRANSMISSION | AIRBORNE TRANSMISSION |
|---|---|---|---|---|
| **Apron/gown** | If soiling likely i.e., during procedures likely to generate contamination from blood and body fluids | Wear it on entering room if clothing will have substantial contact with the patient, environmental surfaces or items in the patient's room | Use risk assessment judgment as per Standard Precautions | Use risk assessment judgment as per *Standard Precautions* |
| **Mask** | Wear regular mask during procedures likely to generate contamination with aerosols | Use risk assessment judgement as per *Standard Precautions* | Wear fluid resistant surgical /medical mask on entering patient room/cubicle<br>N.B. in areas of community COVID-19 transmission HCWs to wear medical /surgical masks continuously<br>throughout their shift in clinical areas | Wear high efficiency filtration mask (FFP3 or N95) on entering the room. |
| **Eye protection/ face shields** | During procedures likely to generate contamination with blood and body fluids | Use risk assessment judgement as per *Standard Precautions* | Use risk assessment judgement as per *Standard Precautions* | Use risk assessment judgement as per *Standard Precautions* |
| **Equipment decontamination** | Yes | Yes | Yes | Yes |
| **Environment cleaning** | Yes | Yes | Yes | Yes |
| **Miscellaneous** | Avoid contaminating environmental surfaces with gloves | Remove gloves and gown, wash hands before leaving patient's room | Provide at least 1,5 metre (3 feet) of separation be- tween patients in cohort | Advise patient to cover nose and mouth when coughing or sneezing |

*Reproduced with modification from Damani N. Manual of Infection Prevention and Control. Oxford: Oxford University Press, 2019*

**Special note on Viral Haemorrhagic Fever**

- Since Lassa fever is endemic in South Sudan and other West African countries special attention is given to its prevention and control.
- Lassa fever is an acute viral haemorrhagic illness with an incubation period of 2-21 days, transmitted to humans via contact with food or household items contaminated with rodent urine or faeces
- Person-to-person infections and laboratory transmission can also occur, particularly in healthcare facilities lacking adequate IPC measures.
- The overall case-fatality rate is 1%. Observed case-fatality rate among patients hospitalized with severe cases of Lassa fever is 15%.
- Early supportive care with rehydration and symptomatic treatment improves survival.
- Prevention of Lassa fever relies on promoting good "community hygiene" to discourage rodents from entering homes.
- In health-care settings, staff should always apply standard precautions (chapter 3) when caring for patients, regardless of their presumed diagnosis. These include hand hygiene (chapter 3.1), use of appropriate PPE to block splashes or other contact with infected materials (chapter 3.2), respiratory hygiene (chapter 3.5) safe injection practices (3.7) in addition to safe burial practices.
- **Health-care workers caring for patients with suspected or confirmed Lassa fever should apply extra infection control measures to prevent contact with the patient's blood and body fluids and contaminated surfaces or materials such as clothing and bedding. When in close contact (within 1 metre) of patients with Lassa fever, health-care workers should wear face protection (a medical mask and a face shield or goggles), a clean, non-sterile long-sleeved gown, and gloves (sterile gloves for some procedures).**
- Laboratory workers are also at risk. Samples taken from humans and animals for investigation of Lassa virus infection should be handled by trained staff and processed in suitably equipped laboratories under maximum biological containment conditions.
- Since the treatment of patients with Lassa fever requires the use of isolation facilities and advanced clinical resources, evacuation from rural primary care hospitals to better equipped medical centres may be desirable. Health authorities should consider the selection and designation of regional hospitals as Lassa fever treatment centres. These hospitals should be suitably equipped and selected personnel should be trained in isolation techniques and in the management of patients with severe illness.

**Signage**

- Use standardized, easily visible signs for clinical and support staff (including cleaning staff) to identify patients who are on TBPs.
- Signs should be placed to prompt HCWs and visitors to put on appropriate PPE prior to entering the patient room where indicated, and to remove the PPE and perform hand hygiene upon exiting.
- Ensure patient confidentiality (i.e., be careful not to display type of illness or infectious organism) when displaying signs. If the patient is having tests or being transferred, notify other hospital departments or other facilities that the patient is on Transmission-Based Precautions.

**Considerations in facilities with limited resources**

- Implementing TBPs can present challenges when resources are limited. Health facilities might need to adjust standard approaches to accommodate local conditions or resources.
- Patient isolation - if enough single rooms are available:
    - Prioritize single rooms for patients likely to be the most infectious e.g., patients with cough, active diarrhoea, or high fevers.
    - Place the in a low-traffic area, and maximize the distance from other patients. Make sure to clearly highlight that the patient requires special precautions e.g., use barriers, such as curtains, chairs, rope, or other material, to mark off the isolation area. Coloured tape can be used on the floor for contact precautions.
    - Limit access to the isolation area, and make sure hand hygiene can be performed at the point of care and PPE is available right outside the isolation area.
- Cohorting - if there is more than one patient infected or colonized with the same infectious agent, cohort the patients in the same room or area. Clearly mark off the area as being for isolated patients only. Control access to the area if possible.
    - Make sure hand hygiene is available near the patient care area and PPE is available right outside the isolation area.
    - Dedicated staff should be used for the cohort so that only a limited number of staff are exposed to those patients and those staff do not provide care to other patients.
- Place vulnerable patients without the infectious agent in areas away from the isolation area. These patients include new-borns and those with compromised immune systems, typically, and individuals with chronic illnesses.
- If non-critical patient care items must be shared, make sure that these items are cleaned and disinfected prior to use on the next patient (see chapter 6 on cleaning/decontamination).
- In the context of COVID-19, WHO provide the following advice during severe shortages of PPE:
    - WHO is not recommending extended use or re-use of PPE but provides guidance on how to do this appropriately if health care facilities take this decision due to short supply
    - PPE extended use (using for longer periods of time than normal according to standards);
    - Reprocessing followed by reuse (after cleaning or decontamination/sterilization) of either reusable or disposable PPE;
    - Considering alternative items compared with the standards recommended by WHO
    - Each of these measures carries significant risks and limitations - considered only as a last resort when all other strategies for rational and appropriate use and procurement of PPE have been exhausted.
    - Extended use of masks or respirators:
    ~ The use without removing for up to 6h, when caring for a cohort of COVID-19 patients
    ~ Reprocessing:
        - not advised for surgical masks
        - Possible for respirators using vapor of hydrogen peroxide or UV radiation.
- See also chapter 3.1, Hand Hygiene.

**Additional considerations**

- Patient and family considerations - when TBPs are indicated, efforts must be made to counteract possible adverse effects on patients (i.e., anxiety, depression and other mood disturbances).

**Table 38: Approaching TBPs using a multimodal strategy**

| | |
|---|---|
| System change – build it<br>*(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)* | • Put in place/improve a sustainable system to reliably procure and deliver necessary supplies needed to enable: (a) compliance with hand hygiene at the 'Five Moments', that is, alcohol-based hand rub at the point of care, water, soap and hand drying materials; (b) compliance with recommended contact, droplet and airborne precautions, that is, PPE, with a focus on the need for a range of sizes.<br>• In settings where water access/quality are not readily available, develop a plan for improving water access and quality.<br>• In settings where bar soaps are used for handwashing, they should be kept dry; hand drying materials should be single use (particularly important for contact precautions).<br>• Develop/adapt enforceable protocols/standard operating protocols available at the point of care on: (a) who decides about patient isolation (that is, designate nurses as decision-makers on isolation as they are 24/7 on the wards and it can be done in a more timely manner; (b) which organisms require the implementation of TBPs and isolation (see table 19) (c) criteria for ward closure, for example, outbreaks; (d) when is it acceptable to care for patients with different organisms in the same cohort and how the geographical separation should be done (that is, where there is no availability of separate rooms and influenced by local epidemiology); (e) what supplies need to be procured and distributed regularly.<br>• Define and agree on roles and responsibilities for effective procurement systems with strong IPC involvement.<br>• Adequate patient to staff ratio<br>• Implement environmental and engineering controls (e.g., separate area for isolation or cohorting, standards for adequate ventilation according to specific areas in the facility, environmental cleaning protocols) according to type of TBP |
| Training and education – teach it<br>*(to improve health worker knowledge)* | • Assess local training needs.<br>• Use Open WHO training material<br>• Reinforce application of the 'Five Moments' for hand hygiene for patients with invasive devices<br>• Ensure that senior management and hospital administrators fully understand all aspects of TBPs, including the importance of the moments for hand hygiene, the use of PPE, and the indications for instituting TBPs, triage and isolation.<br>• Secure sign-off of training plans by senior managers (for example, by the IPC committee or equivalent)<br>• Train staff on a regular schedule on all aspects of TBPs (focus on pre-employment/orientation and periodic updates) and enable staff to train others. |

| | |
|---|---|
| | • Develop information/educational resources using a range of media for patients and carers with a focus on the implications of infection/colonization and psychological support.<br>▪ Those performing training should be competent in the subject matter. |
| Monitoring and feedback – check it<br>*(to assess the problem, drive appropriate change and document practice improvement)* | • Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) regarding:<br>o reliable availability of hand hygiene infrastructures and products, for example, clinical handwash basins, soap, water, hand drying products, alcohol-based hand rub;<br>o percentage of staff compliant with standard operating procedures/protocols, for example, hand hygiene compliance according to the 'Five Moments'; (b) use of TBPs, including a mechanism for reporting shortages, stockouts and failure of PPE;<br>o reliable availability of isolation and cohorting facilities;<br>o appropriate use of isolation and cohorting facilities;<br>o availability and use of patient and visitor information materials;<br>o correct and timely implementation of contact precautions and isolation or cohort<br>• Ensure that monitoring, reporting and feedback mechanism address decision makers in addition to health care workers.<br>• Consider the development/use of daily/weekly checklists |
| Reminders and communication – sell it *(to promote the desired actions, at the right time, including campaigns)* | • Raise awareness of the list of Clinical Syndromes/Conditions Warranting Empiric Transmission-Based Precautions in addition to Standard Precautions (see table 19) – encourage discussion of TBPs during handovers to reinforce key messages<br>• In collaboration with staff, develop/adapt:<br>o bedside identification reminders that respect the patient's rights to privacy and dignity;<br>o awareness-raising messages (for example, posters) placed appropriately to remind staff of correct practices;<br>o scripts/prompts for local champions to use when communicating on necessary IPC measures for TBPs<br>o memos (electronic/paper) to communicate rapidly and on a large scale, for example, during outbreaks;<br>o videos on the appropriate use of PPE;<br>o patient information materials (leaflets and visual resources to account for low literacy).<br>• Support and strengthen communications between different team members (laboratory, microbiology, IPC, clinicians). |

| | |
|---|---|
| Culture and change – live it *(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)* | • Encourage senior management to use relevant opportunities to explain that the facility is supportive of tackling HAI and to promote and reinforce protocols/standard operating procedures.<br>• Engage senior clinicians and nurses to explain to colleagues the importance of TBPs, including triage, patient placement and patient identification<br>• Identify champions to be role models for the correct use of PPE.<br>• Put in place visible signage showing key leader commitment to TBPs |

The type of Transmission-based Precaution assigned to a patient depends on the mode of transmission of the suspected or known pathogen. The three main modes and how to implemented them are summarised in tables 37-39.

### 7.1 Contact Precautions

Contact precautions

| | |
|---|---|
| Why contact precautions are needed | • Contact transmission is the most common way that microbes spread from one infected or colonized person to another, usually via direct or indirect contact e.g., when healthcare workers touch a patient's skin, their hands can become contaminated with microorganisms from that patient. If the HCW then touches another patient without performing hand hygiene, they have carried microorganisms to the second patient |
| When and how - | • Triage will identify which patients require contact precautions. Health workers should be made aware of the clinical syndromes and conditions requiring contact precautions (see table XX Clinical Syndromes/Conditions Warranting Empiric TBPs in addition to Standard Precautions)<br>• Organisms or conditions that require Contact Precautions include multidrug-resistant (MDR) organisms such as MDR *Acinetobacter baumannii*, abscesses with major draining, and incontinence or severe diarrhea.<br>• Contact precautions include: (1) appropriate patient placement; (2) use of personal protective equipment, including gloves and gowns; (3) limiting transport and movement of patients; (4) use of disposable or dedicated patient care equipment; and (5) prioritizing cleaning and disinfection of patient rooms<br>• In some circumstances, depending on the individual risk assessment of some patients, pre-emptive isolation/cohorting and the use of contact precautions may be necessary until the results of surveillance cultures for certain organisms are available (e.g., CROs). |

Contact precautions

| | |
|---|---|
| Appropriate patient Placement – isolation and/or cohorting | • Isolate patients who require Contact Precautions in a private/single room, if possible.<br>• When single-patient rooms are in short supply or not available:<br>~ Prioritize single rooms for patients with conditions that may spread pathogens (e.g., faecal incontinence).<br>~ If it becomes necessary to place a patient on Contact Precautions in a room with patients who are not infected or colonized with the same pathogen, avoid placing that patient in an area with immunocompromised patients, for example, pregnant patients or burn patients.<br>~ Make sure that patients are physically separated (more than 1 meter/3 feet apart) from each other; if there are privacy curtains, make sure they are closed. Consider using physical barriers to prevent HCW from moving directly from a patient on Contact Precautions to one that is not.<br>~ If in a shared room with a toilet, patients should avoid sharing a toilet; one patient can be offered a bedside commode or bedpan.<br>• Clear communication regarding a patient's colonization/infection status is important e.g., flagging the medical chart.<br>• Applying contact precautions could involve potential unintended consequences for the patient (for example, patient frustration or discomfort during treatment with contact precautions). Mitigation measures should be considered. |
| Patient Care Equipment | • Use disposable or dedicated patient-care equipment (e.g., blood pressure cuffs, stethoscopes) and reprocess (i.e., clean and disinfect) equipment before reuse on other patients. |
| PPE (see PPE in Standard Precautions*)* | • *See the PPE chapter for details about how to put on and remove PPE.*<br>• Put on a clean, non-sterile gown and gloves upon entering the patient care area; remove and properly discard before exiting the patient room to contain infectious agents. Perform hand hygiene according to the 5 Moments and this includes before putting on and immediately after removing PPE.<br>• For semi-private or multi-patient rooms, do not use the same PPE between patients. Remove PPE, perform hand hygiene, and put on new PPE before coming in contact with another patient and or patient environment (i.e., room, bed, etc.)<br>• Occupational health issues associated with the use of some PPE (for example, latex gloves) should also be taken into consideration for health care workers. |
| Transport and movement | • When transport is necessary, ensure wounds or lesions are covered. |

Contact precautions

- Remove and dispose of PPE, then perform hand hygiene, prior to transporting patients on Contact Precautions. DO NOT wear PPE outside of a patient's room.
- Put on clean PPE to assist the patient once at the destination in the hospital.

Cleaning

- Ensure rooms of patients on Contact Precautions are frequently cleaned and disinfected (at least daily and prior to use by another patient). Focus cleaning on toilets, frequently-touched surfaces, and equipment in the immediate patient area.
- Use gloves and gown when cleaning patient care equipment and the environment of a patient who has been on Contact Precautions. Remove and discard gloves and gowns immediately after cleaning is complete.
- Organisms that form spores require cleaning products, such as bleach, that inactive spores, which are more difficult to destroy than vegetative microorganisms. If bleach is used, it must be prepared fresh daily and properly diluted.

## 7.2 Droplet Precautions

Droplet precautions

Why droplet precautions are needed

- Droplet Precautions are intended to prevent transmission of pathogens spread through close respiratory or mucous membrane contact with respiratory secretions
- Patients are placed on Droplet Precautions when they have known or suspected infections transmitted by splashes of respiratory secretions. Droplets are small amounts of liquid from the lungs, mouth, or nose that are expelled into the air when people cough, talk, or sneeze. Droplets can also spread through hands when people sneeze or cough into their hands and then touch mucous membranes of another person or an environmental surface.

When and how

- Triage will identify which patients require droplet precautions. Health workers should be made aware of the clinical syndromes and conditions requiring droplet precautions (see appendix 11 Clinical Syndromes/Conditions Warranting Empiric TBPs in addition to Standard Precautions). Patients should wear a surgical mask while awaiting evaluation
- Because these pathogens do not remain infectious over long distances in a healthcare facility, special air handling and ventilation are not required to prevent droplet transmission.
- Organisms that require Droplet Precautions include *B. pertussis,* seasonal influenza virus, adenovirus, *Neisseria meningitidis,* and certain types of pneumonia.

Droplet precautions

- Emerging organisms that spread via droplets, such as the viruses that cause severe acute respiratory syndrome (SARS, SARS Cov-2), Middle East respiratory syndrome (MERS), have additional precautions recommended to limit transmission (see annexe 12 Clinical Syndromes/Conditions Warranting Empiric TBPs in addition to Standard Precautions).

Patient Placement

- Single-patient rooms are preferred for patients who require Droplet precautions
- When single-patient rooms are in short supply or not available, apply the following principles to help decision-making:
    - Prioritize any single-patient rooms for patients with excessive cough and sputum production.
    - If it becomes necessary to place a patient on Droplet precautions in a room with patients who are not infected with the same pathogen, avoid placing that patient in an area with immunocompromised patients.
    - Ensure patients are physically separated (more than 1 meter/3 feet apart) from each other; if there are privacy curtains, make sure they are drawn.
- Ideally, place patient in a single room (*See TBP section on considerations in facilities with limited resources*).
- In multi-patient rooms, waiting rooms or similar areas, separation between beds (at least 1 meter or 3 feet) and use of a physical barrier, such as a curtain or divider, is especially important to prevent transmission by droplets.
- Aerosol-generating procedures should be performed in a negative pressure room. If a negative pressure room is not available, the aerosol-generating procedures can be performed in a room equipped with an exhaust fan draining air into a low-traffic area.

PPE

- *See the PPE chapter for details about how to put on and remove PPE*.
- HCWs wear a mask (a respirator is not necessary) for close contact with infectious patients; the mask is generally donned upon room entry.
- Additional PPE might be indicated, depending on the nature of the patient interaction—in other words, based on a risk assessment.
- Remove and properly discard PPE before exiting the patient room. Perform hand hygiene immediately after removing PPE.

Patient transport

- When transport is necessary, instruct the patient to wear a mask and follow Respiratory Hygiene and Cough Etiquette.
- No mask is indicated for HCWs transporting patients on Droplet precautions.

Droplet precautions

- If the patient cannot tolerate a mask, HCP should put on a mask for patient transport and provide tissues to the patient to use when coughing.

Cleaning

- Maintain routine cleaning and terminal cleaning practices.

## 7.3 Airborne Precautions

Airborne precautions

Why airborne precautions are needed

- Airborne transmission occurs when microorganisms are aerosolized into tiny particles that become suspended in air and travel on air currents over long distances. This can happen when an infected person coughs, talks, or sneezes. Microorganisms can also be aerosolized during medical procedures and by medical equipment. Since some microorganisms can survive on air currents over long periods, they can be inhaled by susceptible persons who have not had face-to-face contact (or been in the same room) with an infectious person.
- Airborne Precautions prevent transmission of these infectious agents that remain infectious over long distances when suspended in the air.

When and how

- Triage will identify which patients require airborne precautions. Health workers should be made aware of the clinical syndromes and conditions requiring airborne precautions (see table XX Clinical Syndromes/Conditions Warranting Empiric TBPs in addition to Standard Precautions)
- Patients should wear a surgical mask while awaiting evaluation.
- Organisms that require Airborne Precautions include Mycobacterium tuberculosis, the measles virus, and the varicella zoster virus (chickenpox).
- Some AGPs have been associated with an increased risk of transmission of coronaviruses (SARS-CoV-1, SARS-CoV-2 and MERS-CoV). The current WHO list of these AGPs is: tracheal intubation, non-invasive ventilation (e.g., BiPAP, CPAP), tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation, bronchoscopy, sputum induction induced by using nebulized hypertonic saline, and autopsy procedures. It remains unclear whether aerosols generated by nebulizer therapy or high-flow oxygen delivery are infectious, as data on this is still limited.

Patient Placement

- Ideally, patients should be placed in an airborne infection isolation room (AIIR) - a room specifically designed with special air handling and ventilation systems to prevent transmission of airborne infections. AIIR design includes:
  - ~ negative pressure (air flows from corridor to inside the patient room) compared to the corridor, and 6—12 air exchanges per hour
  - ~ direct exhaust of air to the outside, away from places where people walk or congregate and any air intake openings
  - ~ a door kept closed when not required for entry and exit
- If an AIIR is not available, place patients in a room designed with ventilation in mind and keep doors closed. Ideally, any room intended for patients on

Airborne precautions

Airborne Precautions is away from heavy traffic areas in the healthcare facility and does not share ventilation with any other patient rooms or wards.

- Ventilation moves outdoor air into a building or a room and distributes the air within that building or room. Natural ventilation is when natural forces, such as wind, move air in and out of a room. [Consult WHO Manual on Natural Ventilation for Infection Control in Healthcare Settings]
- To provide natural ventilation:
    - ~ Use a room that has good cross-ventilation (two or more windows that open) to the outdoors.
    - ~ Use an exhaust fan in one window to assist moving room air to the outdoors, making sure the exhaust window is away from people and any air intake openings.
    - ~ Turn off air-conditioning and open windows to enhance ventilation if an independent air supply is not available.
    - ~ Keep the door to the hallway closed, except for when HCP enter and exit the room.
- Movements in and out of the room should be limited to HCWs caring for the patient.
- Restrict susceptible HCWs from entering the room of patients known or suspected to have measles, chickenpox, disseminated zoster, or smallpox if other immune HCWs are available.

Immunize susceptible persons as soon as possible following unprotected contact with vaccine-preventable infections (e.g., measles, chickenpox,)

Airborne precautions

PPE

- *See the PPE chapter for details about how to put on and remove PPE*.
- HCWs caring for patients on Airborne Precautions wear a particulate respirator, such as a fit-tested N95 mask, and conduct a seal check before entering the patient's room. A seal check should be performed every time the N95 mask is worn.
- Gown, gloves, and eye protection are not needed for many organisms transmitted exclusively by the airborne route (such as *M. tuberculosis*, and the varicella virus), but may be needed when an infectious microorganism is transmitted by multiple routes or when multiple pathogens are possible, as is the case with influenza, SARS Cov-2 and tuberculosis.
- COVID-19-specific guidance: health workers performing AGPs or in settings where AGPs are performed among suspected or confirmed COVID-19 patients (e.g., intensive care units or semi-intensive care units) should:
    - ~ Perform procedures in an adequately ventilated room

Airborne precautions

- use appropriate PPE: wear a particulate respirator at least as protective as a US National Institute for Occupational Safety and Health (NIOSH)-certified N95, European Union (EU) standard FFP2, or equivalent.
- Although initial fit testing is needed prior to the use of a particulate respirator, many countries and health-care facilities do not have a respiratory fit testing programme. Therefore, it is critical that when health workers put on a disposable particulate respirator, they should always perform the required seal check to ensure there is no leakage.
- Note that if the wearer has a beard or other thick facial hair this may prevent a proper respirator fit.
- Other PPE items include eye protection (i.e., goggles or a face shield), long-sleeved gown and gloves. If gowns are not fluid resistant, health workers performing AGPs should use a waterproof apron if the procedure is expected to produce a large volume of fluid that might penetrate the gown;
- in the intensive care units, where AGPs are frequently performed, the health worker may choose to wear a particulate respirator throughout his or her shift, in areas of community transmission;
- keep the number of persons present in the room or unit to the absolute minimum required for the patient's care and support.

Transport

- When transport is necessary, instruct the patient to wear a mask and follow respiratory hygiene and cough etiquette.
- Cover any skin lesions associated with varicella or *M. tuberculosis* to prevent aerosolization or contact with the pathogen in skin lesions.
- No mask or respirator is indicated for HCP transporting patients on Airborne Precautions if the patient is wearing a mask and infectious skin lesions are covered.
- If the patient cannot tolerate a mask, HCP should put on a mask for patient transport and provide tissues to the patient to use when coughing.

*Cleaning*

- Use a respirator when cleaning patient care equipment and the environment of a patient who has been on Airborne Precautions. Once terminal cleaning of the room and all equipment has been completed, wait for aerosols to clear the room before entering an Airborne Precautions room without a respirator.

# Chapter 8: IPC in the Built Environment

Patients should receive care in a clean and/or hygienic environment that support adherence to infection prevention and control (IPC) practices and prevent and control healthcare-associated infections (HAs) as well as antimicrobial resistance (AMR). An appropriate environment, water, sanitation and hygiene (WASH) services, materials and equipment for IPC are a core component of effective IPC programmes at healthcare facilities. Healthcare buildings must comply with the national legislation and regulations.

Designers, architects, engineers, facilities managers and planners work in collaborative partnership with IPC teams to deliver facilities in which IPC needs have been planned for, anticipated and met. It is essential that IPC teams are consulted during the planning, building and renovations of hospitals and anything related to the built environment.

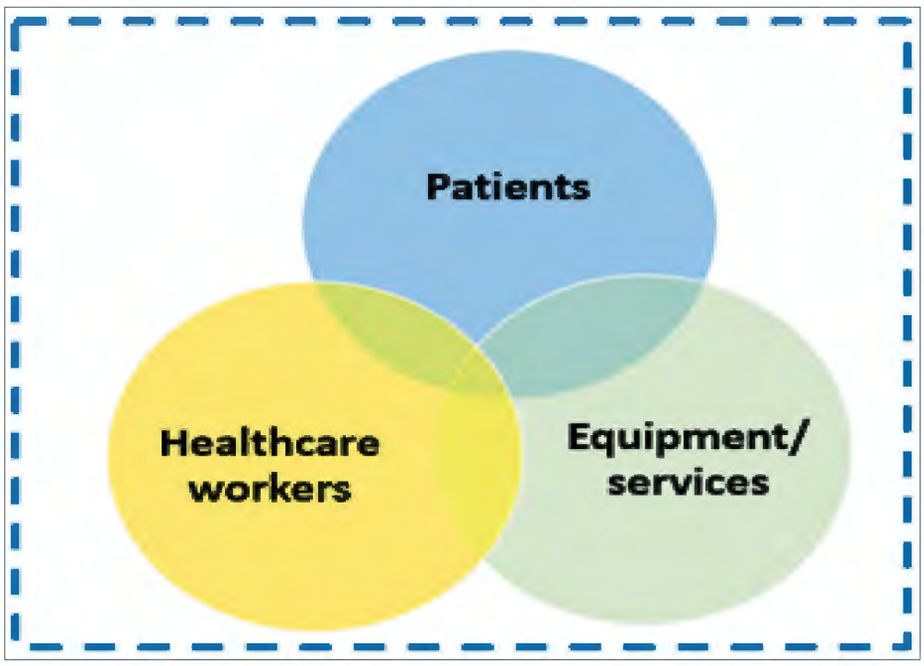
**Built Environment**

IPC plays an important role in the prevention of infections in the planning, design, construction, refurbishment and maintenance of healthcare facilities. IPC measures must be “designed-in” at the outset of the planning and design stages of healthcare facility and that input continues up to, into and beyond the final building stage. Factors to consider include:

- Flow of patients, staff, equipment and supplies
- The mode of transmission of pathogens
- Environmental hygiene
- Care and cleaning of equipment
- Patient profile
- Available services
- Climate
- Safe and clean water
- Functioning water facility

The built environment has a direct effect on the implementation of IPC practices and workflow. **Figure 12** depicts the relationship between patients, health workers and equipment and services in the healthcare environment (the building). In most temperate climates, natural ventilation is preferred with mechanically controlled ventilation for specialised areas only, such as operating theatres, neonatal units, burns units and sterile preparation and decontamination areas.

**Figure 12: Healthcare environment relationships**




**The environment and layout**

The air temperature, humidity and airflow in the healthcare setting should provide a comfortable environment for patients, staff and carers. Adequate airflow should be ensured to minimise the risk of transmission of airborne pathogens from infected patients and reduce risks to susceptible staff, patients and carers. The air flow can be either natural air flow or mechanical airflow. Natural ventilation can achieve 17-40 air changes per hour, while well-functioning standard mechanical ventilation achieves around 12 air changes per hour. There should be sufficient lighting, preferably natural lighting, during daylight working hours and artificial lighting during evening and night hours, to allow safe movement of staff, patients and carers, and normal undertaking of medical activities.

Buildings should be designed to be airy, light, and allow workflow activities to minimise the spread of contamination by the movement of patients, staff and carers, equipment, supplies and contaminated items, including healthcare waste removal, and to facilitate good IPC practices.

## 8.1 Patient clinical areas (wards, waiting areas, patient consulting rooms)

Healthcare settings should be built, furnished and equipped with materials that minimise infectious disease transmission and facilitate cleaning.

**Layout**

The layout of all clinical areas should minimise transmission of pathogens. The design and space should be adequate to allow facilitation of trolleys and people in wheelchairs as well as to minimise infectious disease transmission. All surfaces must be made of material that is easy to clean and water resistant. There should be a designated staff workstation and rest area provided so that the clinical areas are secured and not used for non-clinical purposes.

In hospitals the allocation of the number of beds should **not be more** than six to eight per room allowing for an unobstructed space of at least 1.2 - 2 metres between beds to enable movement of carers and equipment. In high care areas, this distance should be increased to 2.5 metres between beds to allow for movement of equipment and to carry out aseptic procedures comfortably.

There should be adequate isolation facilities. It is recommended that there are at least two isolation/single rooms with en-suite ablution facilities per 24 beds in hospitals. Hospitals that have designated infectious disease units or a high infectious diseases profile in the community (such as high TB or diarrhoea), should increase the number of isolation beds to three or four per 24 beds.

**Hand hygiene**

Handwash basins in hospitals should be placed outside the patient zone to avoid splashing and spread of pathogens. Handwash basins should be located nearest to the door. Ideally, the ratio of basins to beds is 1:10, however in isolation rooms there should be one basin outside the entrance of the room. ABHR (alcohol based hand rub) should be placed at the entrance of a clinical area and at the point of care

All consultation rooms should have facilities for hand hygiene in each room. **Table 42** provides the requirements for clinical handwash basin.

**Table 39: Requirements for handwash basins**

| | |
|---|---|
| **Handwash basins specifications** | • Conveniently located at the entrance or exit of the ward or clinical area, but not in clinical areas next to the patient.<br>• Dedicated to hand washing only.<br>• Do not have any plugs to prevent soaking of medical devices.<br>• Bowl deep enough to prevent splashing and contamination of clothes.<br>• No overflow outlet<br>• No recesses for water to collect.<br>• Waterproof splashback and properly sealed<br>• Wall mounted soap dispenser<br>• Single use paper towel dispenser |
| **Taps** | • Elbow operated mixer taps<br>• Taps should not be aligned to run directly into the drainage aperture to prevent splashback<br>• Tippy taps and foot operated modern taps |
| **Water** | • Free running and at a comfortable temperature<br>• Good quality water without contamination |

**Furnishings**

There must be adequate clean surfaces around the patient's bed to allow carrying out aseptic procedures and to reduce contact with non-sterile areas (procedure trolleys are preferred). All furniture must be covered in material that can be easily cleaned and if necessary, disinfected. Chairs covered in impervious material should be provided for the patients and visitors to sit on. Visitors should not sit on beds. There should be a bedside table and a separate overbed table used for clinical purposes. Ensure mattresses and pillows are covered with intact impervious chemical resistant covers for easy cleaning. Interbed (privacy) curtains should be washable and should preferably be changed with each patient discharge as part of the linen change.

**Floor covering**

Clinical areas should have continuous washable floor coverings which are water resistant, dry quickly and not negatively affected by detergents, disinfectants and other cleaning materials.

The floors should be continuous, slopy and smooth with the floor covering extending up the wall to 25 cm to facilitate cleaning. Joints must be sealed to allow for easy cleaning and reduce dust traps and for vector control.

Vinyl or similar floor covering is preferred or epoxy resin floors in heavy use areas. Wooden floors and carpets are not recommended in clinical areas. Carpets are difficult to clean and harbour pathogens. Tiles are not recommended as these are difficult to clean and get easily damaged due to the high wear and tear of a busy health facility.

**Walls**

Walls should be of adequate height, smooth, covered with paint or materials that are water impermeable and easily washable. The walls should be smooth and washable.

**Ceilings**

Ceilings should have a homogenous plastered surface with flush, mounted recesses for lights, ventilation grilles and other ceiling fixtures. Removable grid tiles are not advisable in isolation rooms. Ceiling joints should be sealed to prevent dust and leakage from entering the clinical areas.

**Surfaces**

All ledges, surfaces and cupboard should be smooth and without any crevices or open joints and should be made of material that can be easily cleaned and regularly wiped with detergents and disinfectants.

**Procedure trolleys**

Procedure trolleys should have impervious and chemical resistant surfaces. It is preferable that all procedures are carried out using a procedure trolley that has been thoroughly cleaned and is dry. The trolley should be prepared in a clean area. Procedures should not be carried out using the patient's bed as a "sterile" work surface. However, in confined spaces, the overbed table maybe the only available surface and if used, must be cleared of clutter, wiped over with /disinfectants such as alcohol and allowed to dry before opening a sterile pack.

## 9.2 Support Areas

**Staff rest areas and meeting rooms**

It is important to ensure the well-being of staff as well as preserving valuable clinical space from being used for such purposes. There must be a dedicated area for staff to rest and eat.

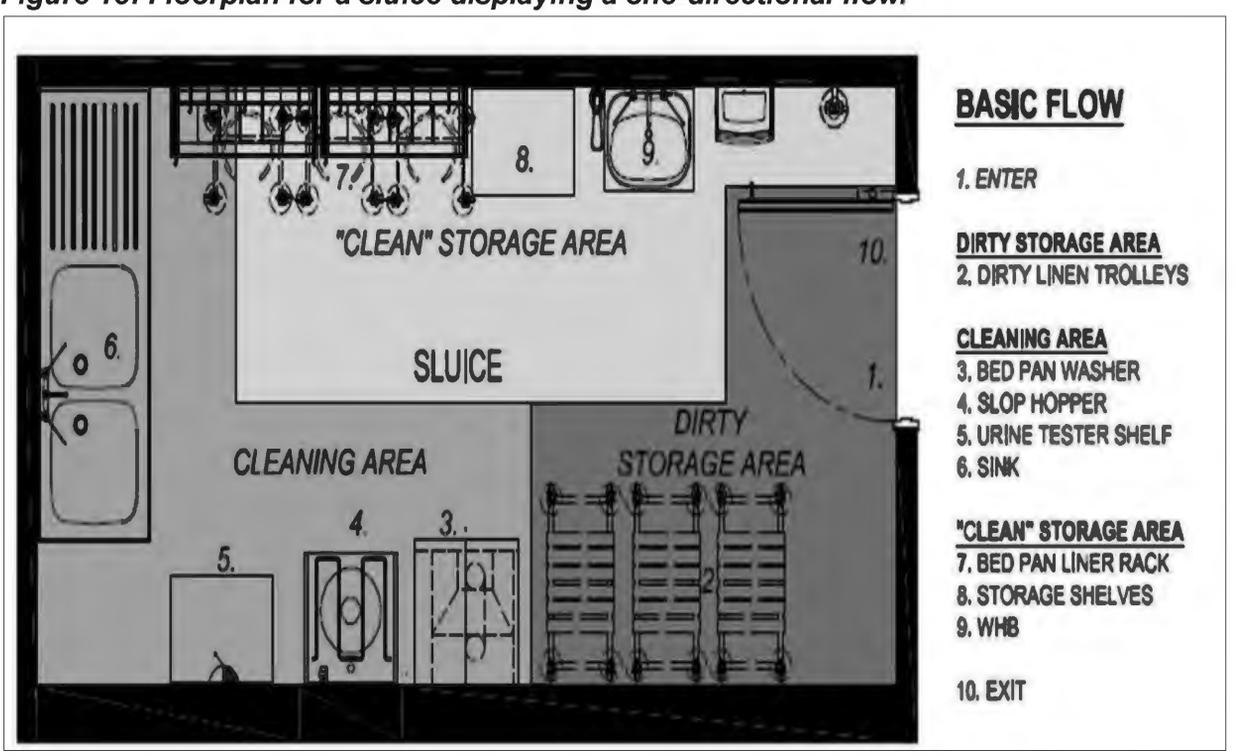
**Storage facilities**

There must be provision made for linen (clean and dirty separately), surgical consumables and equipment which is not in frequent use. This will require extra storage space which is easily accessible.

**Sluice**

There must be a separate sluice area for disposing of patient bodily fluids, urine and faeces. This is a high-risk area for transmission of MDROs (particularly Gram-negative bacteria from the patient's faeces and biofilm in the drains). **It is highly recommended that bedpans, urinals and patient wash bowls are heat disinfected after each use to reduce transmission of MDROs.** If heat disinfection is not possible, bedpan should be washed with a detergent and water and wiped with a freshly made hypochlorite solution (1:1000 ppm) Consider a one-direction flow from dirty to clean in the sluice. Ensure that a dedicated hand wash basin is available at the exit/entrance to the room to encourage staff to perform hand hygiene upon leaving the sluice. **Figure 13** provides a schematic example of a one directional flow from dirty to clean in a sluice.

***Figure 13: Floorplan for a sluice displaying a one-directional flow.***




### Utility room/CSSD

Medical devices should not be cleaned in the ward or patient area. It is preferable that all reusable medical devices are sent to CSSD or the Decontamination Unit for cleaning. However, if there is no alternative, cleaning should take place in a separate designated, closed, well-ventilated area, which should be fully equipped to fulfil the necessary requirements, including a deep sink, running water, detergent (as per the manufacturer's recommendations), cleaning brushes, and a drying area for the medical devices after cleaning. The staff must be trained and must wear appropriate PPE. Used linen should be stored in the utility room in a designated used linen trolley for removal to the laundry area or for collection by external laundry services.

### Medical waste

Medical waste in clinical areas should be stored separately and not in the sluice area. Refer to Chapter 4 on the management of medical waste for the requirements of the storage areas for medical waste.

**Treatment room**

A separate clean area for the preparation and storage of medicines, sterile equipment and sterile fluids, and procedure trolleys should be provided. The areas must be airy, clean and dry and must have storage facilities for sterile equipment and surgical packs.

**Water**

The "*WHO standards for drinking water quality, sanitation and environmental health in health facilities"* should be implemented. International and South Sudan guidelines on sanitation should be followed when planning and executing water, sanitation and hygiene delivery. Quality monitoring of drinking water should be done by Environmental health practitioners.

Microbiological, chemical and physical quality of drinking water supplies must conform to the National Standards for all domestic use. A water quality monitoring programme must be developed. All water supply, including borehole and tankers, must be protected from contamination. The temporary storage capacity should be sufficient for 3 days (72 hours).

Where borehole water is being used in a health facility, at least 20 – 45 m horizontal distance and 1.5 m vertical distance between permeable faecal sludge containers and drinking-water sources is suggested. Faecal sludge should not be discharged into an open drain, water body or open ground.

## 8.3 Sanitation

There must be adequate functioning toilet facilities which cater for staff and patients separately. Patient toilets should be available for both male and females and there must be provision for menstrual hygiene in female toilets. WHO recommends one toilet per 20 users for inpatient settings; at least four toilets per outpatient setting. More recently, the minimum number of toilets required to meet the criteria for a basic sanitation service is one toilet dedicated for staff and one gender-neutral toilet for patients that has menstrual hygiene facilities and is accessible for people with limited mobility.

Adequate toilet and ablution facilities should be provided at a hospital that meets the needs of patients, staff and visitors.

- At least one functioning toilet and one handwash basin for not more than 20 in-patients,
- At least one functioning toilet and one handwash basin for not more than every 50 visitors.
- Separate toilet and hand washing facilities must be provided for staff members.
- At least one bath or shower for every 12 to 15 patients.
- Staff required to sleep on the premises must be provided adequate wash up facilities, including a shower/bath.
- A drainage system must be in place and approved measures are utilized for the removal of wastewater.
- An adequate supply of toilet paper, liquid soap and/or alcohol-based hand rub must be available in the facility

## 8.4 Operating Theatre

It is beyond the scope of this document to give a detailed account of specialised areas such as the operating theatre and intensive care units. The narrative below summarises the essential areas from an IPC perspective.

**Areas in the Operating Theatre**

The surgical suite is usually divided into two designated areas: **semi-restricted and restricted**, defined by the physical activities performed in each area.

The **semi-restricted** area includes the peripheral support areas of the surgical suite, including storage areas for clean and sterile supplies, sterile processing rooms, scrub stations, and corridors leading to restricted areas. The semi-restricted area is limited to authorized personnel and to the patient. Surgical attire as well as headgear is recommended in this area.

The **restricted** area is primarily intended to support a high level of asepsis control. In the restricted area, which includes the preparation or layout room, operating rooms, surgical attire, head covering, and masks are required where open sterile supplies or scrubbed persons are present.

Operating rooms (OT) should be equipped with **positive pressure systems** to ensure that air flows from the operating room to adjacent areas, thus minimizing inflow of air to the operating room. This positive pressure system is challenged every time a door is opened.

**Ventilation**

The spread of microbes is regulated by well-balanced mechanical ventilation systems which are designed to keep the operated site, or wound, safe from external contamination. The operating theatre is under positive pressure and is supplied at a minimum of 24 air changes/ hour (ACH) with filtered fresh air being delivered into the operating suite. The air is removed mechanically or via leakages around the doors and windows. The temperature of operating rooms should be kept between 20°C - 24°C, with humidity of 30% to 60%.

**Cleaning in the Operating Theatre**

The inanimate theatre environment should make a negligible contribution to the incidence of SSIs. Cleaning and disinfection of the operating theatre should follow a precise schedule: for example, floors should be cleaned once a day, and at the end of each session. Horizontal surfaces and all surgical items (e.g., tables, buckets) should be cleaned between procedures. Specific blood or body fluid spillages should be dealt with immediately. Walls and ceilings are rarely heavily contaminated; but should be cleaned when visibly soiled. It can be done every 6 months or as needed.

Important points that must be taken into consideration to keep the operating theatre environment as clean as possible are the following:

- Keep personnel in OT to a minimum during a procedure.
- Limit idle conversations as this creates dispersion of bacteria.
- Keep doors closed, and
- Keep entries into the operating room to a minimum during a procedure, as the opening/ closing of doors can generate significant air currents and increase the probability of bacteria being deposited in the surgical site.

**Microbiological commissioning and monitoring**

Commissioning must occur before an operating theatre or other areas in the HCF is **first used and after any substantial modifications** that may affect airflow patterns in pre-existing theatres and specialised areas such as ICU. It is important that the IPC team is involved at all stages from pre-design through to opening and that adequate time for commissioning is built into the schedule, including an allowance of time for microbiological assessments (particle count and microbiological contamination).

Contractual conditions should allow commissioning before handover of the theatre or other clinical area or allow for delayed acceptance after handover such that faults can be rectified.

- The **theatre and specialised** areas interior should be checked for obvious defects.
- The **air distribution** within the theatre and between rooms in the theatre suite should be checked by smoke tracing.
- The **air handling unit** supplying the theatre and specialised areas should be properly constructed, finished and functioning.
- The **air change rates** in theatre and preparation room should be satisfactory (>20 ACH). Air change rates will differ in other areas, but the airflow has to be monitored (negative or positive pressure).
- Airborne microbial contamination in an empty theatre should be satisfactory. This can be done with microbial testing (settles plates), or particle counts of the air.
- In addition, particle counts using a bio sampler should be done after filters have been changed in the Operating Theatre.

**Routine culturing of clinical areas is unnecessary because inanimate objects and surfaces are seldom the cause of SSIs.**

## 8.5 IPC Considerations in the ICU

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| Relevant international and national guidance and tools | • WHO Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level https://www.who.int/infection-prevention/publications/ipc-components-guidelines/en/<br>• WHO Minimum Requirements for infection prevention and control (IPC) programmes https://www.who.int/infection-prevention/publications/min-req-IPC-manual/en/<br>• WHO Guidelines on Natural Ventilation for Infection Control in Health-Care Settings https://apps.who.int/iris/bitstream/handle/10665/44167/9789241547857_eng.pdf?sequence=1 |
| Key practice points | • Appropriate design and layout of the ICU as per guidelines aims to minimise risks of infection. Staff should have access to the right equipment, safe and appropriate decontamination and sterilization of equipment and materials, necessary PPE, supplies and an environment that facilitates safe practice. |

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| | • A program of routine training and education and periodic retraining for all HCWs on IPC should be in place highlighting the special importance of IPC and the challenges posed by caring for people on the ICU<br>• A program of regular monitoring and feedback should be in place and surveillance systems robust to detect outbreaks<br>• IPC practices should be reinforced through awareness raising (e.g., use of posters displayed at the point of care)<br>• Managers and leaders of the unit should show their visible support for safe practice and patient and staff safety |
| Introduction – why IPC is important | • Patients in ICU may experience increased risk of infection due to:<br>~ The severity of the patient's illness and underlying conditions.<br>~ The exposure to multiple invasive devices and procedures.<br>~ Increased patient contact with health-care personnel.<br>~ A longer ICU stay which prolongs the risk of exposure.<br>~ Space limitations that increase the risk of contaminating equipment.<br>~ Antibiotic treatment for long periods.<br>• Most common nosocomial infections are pneumonia (HAP/VAP), CAUTI and CLABSI |
| How and when to prevent HAI | • Hand hygiene: timely and effective hand hygiene at the right moment (chapter 3.1), with special attention to:<br>~ Before performing any invasive procedure including peripheral cannula insertion and removal (Moment 2)<br>~ Before mixing Intravenous fluids (part of Moment 2)<br>~ Before use of multi-dose vials (part of Moment 2)<br>~ Before administration of IV fluids or medications/drugs (part of Moment 2)<br>• Follow standard and transmission-based precautions (chapters 3 and 4) including PPE (chapter 3.2)<br>• IV care practices: chapter 5 addresses aseptic technique for invasive procedures. Bloodstream infection (BSI) prevention is outlined in chapter 3.7, note the following additional considerations:<br>~ Use of aseptic technique relates to peripherally inserted central catheters (PICC) and guidewire exchange.<br>~ Do not routinely replace central venous catheters, haemodialysis catheters, or pulmonary artery catheters.<br>~ Do not remove CVCs or PICCS on the basis of fever alone. Use clinical judgment regarding the appropriateness of removing the catheter if infection is evidenced elsewhere or if a non-infectious cause of fever is suspected.<br>• Respiratory care: chapter 5 addresses aseptic technique for invasive procedures. Hospital acquired pneumonia (HAP) and ventilator associated pneumonia (VAP) prevention are outlined in chapter 5.3, note the following additional considerations:<br>~ Periodically drain and discard any condensate that collects in the tubing of a mechanical ventilator, taking precautions not to allow condensate to drain toward the patient. Decontaminate hands |

with soap and water or a waterless antiseptic agent after performing the procedure or after handling the fluid.

- ~ If available, use an endotracheal tube with a dorsal lumen above the endotracheal cuff to allow drainage (by continuous suctioning) of tracheal secretions that accumulate in the patient's subglottic area.
- ~ Use sucralfate, H2-blockers, and/or antacids interchangeably for stress-bleeding prophylaxis in a patient receiving mechanically assisted ventilation (H2-blockers alone decrease gastric acidity and increase gastric colonization and increases the susceptibility to respiratory infections).

- ICU personnel: see chapter 9, health care worker protection and safety which outlines immunization requirements. Jewellery and other accessories must not be worn during direct patient care.

- Environment Factors and Design Issues:

    - HAI surveillance is addressed in chapter 2.
    - Environmental Cleaning is described in chapter 3.3.
    - Health Care Waste Management is addressed in chapter 3.6.
    - Prevention of Sharps Injuries is addressed in chapter 3.7
    - The principles of sterilization and medical devices decontamination are outlined in chapter 6.
        - Cleaning and disinfection or sterilization of patient care equipment should not be carried out in the ICU.
        - Used equipment should be sent to the Sterile Service Department or designated reprocessing area. A policy on disposable and reusable items should be clearly defined.

- Screening, triage and isolation: actions that support outbreak management and preparedness In addition, the unit design should consider the following to enhance IPC strategies.
    - ~ Space: beds - Beds should be 2.5 - 3 meters (7-9 feet) apart, to allow free movement of staff and equipment, reducing risk of cross-contamination.
    - ~ Space: partitions - Privacy partitions should be of material that is easily cleaned and should be cleaned weekly and any time that it becomes soiled or contaminated. If curtains are used, they should be changed weekly and between patients.
    - ~ Toilets: May be located outside the ICU.
    - ~ Medication preparation: Medication preparation areas should be separate from patient care areas and should be maintained as a clean area.
    - ~ Clean storage: An area should be identified and maintained for clean storage and should be separate from care and waste disposal areas.
    - ~ Ventilation: Functioning environmental ventilation (natural or mechanical should be available. Windows (if exist) should remain closed in order to control all airborne risks

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| | **Clinical hand wash basins:**<br>• Refer to Chapter 3.<br>Traffic flow: The unit may be situated close to the operating theatre and to the emergency department for accessibility, but should be separate from the main ward areas. Policies should consider controlling traffic flow to and from the unit in order to reduce sources of contamination from visitors, staff and equipment.<br>Visitors: Design of the unit should permit staff to assess visitors for communicable disease (eg, rash, respiratory infection) before permitted to enter unit. They should be instructed in hand hygiene according to the 5 Moments if assisting the patient. |

## 8.6 IPC Considerations in the Neonatal care units (NCUs)

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| Relevant international and national guidance and tools | • WHO Safe Childbirth Checklist https://www.who.int/patientsafety/implementation/checklists/childbirth/en/ |
| Key practice points | • Appropriate design and layout of the department as per guidelines aims to minimize risks of infection. Staff should have access to the right equipment, safe and appropriate decontamination and sterilization of equipment and materials, necessary PPE, supplies and an environment that facilitates safe practice.<br>• A program of routine training and education and periodic retraining for all HCWs on IPC should be in place highlighting the special importance of IPC and the challenges posed by caring for neonates<br>A program of regular monitoring and feedback should be in place and surveillance systems robust to detect outbreaks<br>• IPC practices should be reinforced through awareness raising (e.g., use of posters displayed at the point of care)<br>• Managers and leaders of the unit should show their visible support for safe practice and patient and staff safety |
| Introduction – why IPC is important | • Low birth weight and the use of multiple invasive devices means that neonates are highly susceptible to HAI.<br>• In addition, the combination of intensive care and high frequency of exposure of neonates to antibiotics (50-95%) provides an opportunity for emergence of antimicrobial resistant microorganisms.<br>• Neonates are a vulnerable group, susceptible to HAIs.<br>• Implementation of the IPC practices described in this guideline will protect this vulnerable group: hand hygiene according to the 5 Moments, standard and transmission-based precautions and adherence<br>• Handling of neonates should be minimized.<br>• Measures should be taken to minimize the risk of transmission of pathogens from mother to infant.<br>• Staff should perform hand hygiene according to the 5 Moments as well as upon entering and leaving the nursery or NICU.<br>• Equipment and supplies should not be shared between infants.<br>• Infection risk increases with overcrowding and understaffing. |

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| How and when to prevent HAI | • Strict adherence to IPC practices using a multimodal approach:<br>~ Standard precautions and hand hygiene at the 5 moments (chapter 3)<br>~ Transmission based precautions as indicated (chapter 7)<br>~ Invasive devices and aseptic technique (chapter 3.7)<br>• Umbilical Venous Catheters: insert using aseptic technique. Only replace if the catheter site is infected or the catheter malfunctions. Remove and do not replace umbilical venous catheters if any signs of catheter related blood stream infection (CRBSI) or thrombosis are present. Cleanse the umbilical insertion site with an antiseptic before catheter insertion. Avoid tincture of iodine because of the potential effect on the neonatal thyroid. Other iodine-containing products (e.g., povidone-iodine) can be used. Do not use topical antibiotic ointment or creams on umbilical catheter insertion sites because of the potential to promote fungal infections and antimicrobial resistance. Umbilical venous catheters should be removed as soon as possible when no longer needed but can be used up to 14 days if managed aseptically.<br>• Breast milk should be collected and stored aseptically. If a breast pump is used, all pump components in contact with milk should be washed with hot soapy water after each use and sterilized or disinfected daily.<br>• Isolation rooms are rarely indicated if there are adequate numbers of nursing and medical personnel and hand hygiene stations to support adherence to IPC practices; sufficient space is available for a 1–2-meter aisle area between new-born stations.<br>• Single room isolation is recommended for infants with infections with airborne transmission, such as varicella, measles, tuberculosis and possible influenza. A separate (quiet) room is also used for children with neonatal tetanus.<br>• Infants of mothers with perinatal varicella (chicken pox) should also be isolated in a single room.<br>~ AMR prevention strategies<br>~ Attention to environmental cleaning<br>~ Surveillance<br>~ Health care worker protection and safety<br>~ Clinical hand wash basins:<br>• Clinical handwash basins have been implicated in numerous outbreaks of resistant organisms (CROs). They must not be used for other purposes. For example, they must not be used for the disposal of any amount of liquid waste or the soaking/cleaning of any items and equipment.<br>• The dimension of the handwash basin should be large enough to contain most splashes during handwashing procedures.<br>• Taps/faucets - Taps should be fitted with a hands-free control (for example, elbow-operated) to avoid contamination. If a handwash basin with conventional tap handles is used, the water should be turned off using a paper towel rather than bare fingers or hands to avoid recontamination of hands.<br>• Taps should not be aligned to run directly into the drain aperture as contamination from the waste outlet could be mobilized and generate aerosols responsible for cross-infection, especially with Gram-negative bacteria (Pseudomonas spp., multidrug-resistant Enterobacteriaceae, etc.) that colonize ‘U bends’, and then dispersed by splashing if disturbed by a stream of water. |

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| | • Swan-neck tap outlets are not recommended as they do not empty after use. Similarly, strainers, aerators and flow restrictors should not be used as they become colonized with bacteria.<br>• Plugs – handwash basins should not have a plug or a recess capable of taking a plug as hands must be washed in running water. Provision of a plug allows the basin to be used to soak and clean items and equipment and this must not be done.<br>• Overflow – handwash basins should not have an overflow as this is not amenable to cleaning.<br>• Location – alcohol-based hand rub at the point of care (that is, within the patient zone) is the gold standard for routine hand hygiene. Ideally, clinical hand washbasins should not be located within the patient zone.<br>• Do not locate hand basins where a patient may get splashed when the handwash basin is used. They should also be readily available and accessible when needed, for example, not behind curtains. |

# Chapter 9: MDR Organisms and AMR

**Key practice points:**

- Perform antibiotic stewardship and monitoring of antibiotic consumption
- Apply triage & identification of patients, contact precautions, patient isolation, hand hygiene to control MDROs
- Ensure cleaning & disinfection of environment, de-contamination of items and equipment to support MDRO control
- Perform surveillance of antibiotic resistant bacteria, monitoring of IPC practices (also see HAI and AMR surveillance section)
- Focus on a combination of a supportive infrastructure, the use of reminders (e.g., posters), training and education (consistent with guideline content), monitoring and evaluation (using a valid and reliable approach) and a safety culture, to make it more likely that MDROs will be prevented.

## 9.1 Importance of IPC in combatting AMR

- Normal microbial flora is protective. The administration of antibiotics kills off susceptible strains of normal bacteria and these are replaced with resistant strains, which are often resistant to many different classes of antibiotics. This replacement occurs most often in the gastrointestinal tract, which carries the bulk of bacteria, and results in stool carriage of multiple antibiotic resistant bacteria.
- Effective IPC is the cornerstone of actions to control AMR and the spread of multidrug-resistant pathogens. Specific threats posed by emerging infections due to CRE-CRAB-CRPsA (referred to here as CROs) require special attention and are covered later in this section. Infections with CROs are associated with high morbidity and mortality, as well as the potential to cause outbreaks and contribute to the spread of resistance.
- Of note within South Sudan the prevalence rate of Extended-spectrum β-lactamase-producing organisms (Gram negative bacteria) is unknown as it is not being reported within tertiary hospitals.
- Antimicrobial resistant organisms can easily spread from patient to patient in the hospital environment via the hands of staff, and contaminated equipment that is not decontaminated effectively.
- AMR threatens the effective prevention and treatment of infectious diseases by reducing the effectiveness of antimicrobial medicines. The misuse, including the over use, of antibiotics increases the number of patients who are colonized or infected with resistant organisms in health care and in the community.
- As microbes become more resistant to common, inexpensive antimicrobials, there is a tendency to move on to more expensive and often multidrug treatment including the use of second- or third-line antimicrobial agents, increasing the cost of health care.
- AMR diminishes the therapeutic choices available to patients and healthcare providers. Other untoward effects of AMR include increased mortality rates, long hospital stays, admission to the intensive care unit and the spread of resistant microorganism to other patients.
- Some types of antimicrobial resistant organisms cause blood stream infections, ventilator associated pneumonia, urinary tract infections, IV infusion site infections, and surgical site and burn site infections.
- If introduced into high-risk units (e.g., ICU, burns) some AMR organisms are very difficult to eliminate.
- For these reasons AMR is considered a global public health threat and every country has committed to develop and implement plans to combat AMR.

- The South Sudan National Strategic Action Plan for Combating Antimicrobial Resistance (2023-2028) outlines the guiding principles and strategies for preventing AMR.
- Prevention of infection through effective IPC and WASH is at the heart of the strategic plan. IPC and WASH are cost effective and can be implemented in all settings to slow the development and restrict the spread of AMR.

## 9.2 How and when to prevent AMR through IPC

The provision of clean water, basic sanitation and good hygiene is needed to stop the spread in health care and in communities.

In addition to **antibiotic stewardship and monitoring of antibiotic consumption** the following IPC measures are required to combat resistance:

- Triage and identification of patients
    - ~ Identify on admission previously known positive patients with antibiotic- resistant bacteria
    - ~ Identify “high-risk” patients using a triage risk assessment form
    - ~ Flag the information in the patient’s notes (manually and/or via electronic record)
    - ~ Patient isolation
    - After identification of patients during triage, isolate **known** patients.
    - In addition, isolate **suspected** patients and take appropriate screening swabs - keep under isolation until microbiological culture results are available
- Implementation of contact precautions
- Surveillance - of antibiotic-resistant bacteria should be undertaken in addition to monitoring of IPC practices. Outbreaks of CarbamaRPsA colonization/infection among patients has been found to be commonly associated with environmental CRPsA contamination involving water and waste-water systems, such as sinks and taps (faucets). Surveillance cultures of the environment for CRE-CRAB-CRPsA may be considered when epidemiologically indicated.
- Hand hygiene - perform timely and effective hand hygiene
- Cleaning and disinfection of environment, decontamination of items and equipment (
    - ~ One of the most important aims of cleaning in the context of some resistant organisms (i.e., CROs) is the prevention of biofilm formation.
    - ~ Keeping relevant surfaces clean and dry will help to achieve this aim.
    - ~ Special attention must be paid to handwash basins in clinical areas with the aim to keep these clean and dry.
    - ~ Clinical handwash basins should not be used for other purposes.
- IPC education/training of all health care workers on prevention of AMR is important (see WHO e-learning modules).
- Targeted decolonization **for control of antibiotic resistant bacteria** (e.g., MRSA) can be effective in the short-term, helping to reduce bio burden and cross-infection in select populations. Body wash: E.g., use antiseptic solution, e.g., chlorhexidine gluconate (4%) daily for 5 days. Nasal ointment: E.g., use mupirocin (2) % nasal ointment twice daily for 5 days. Mupirocin resistance has been associated with widespread, prolonged use and its should initially be limited to 2 consecutive decolonization treatments.
- Minimum use of invasive devices is designed to minimize AMR development.

### 9.3 Prevention of Carbapenem Resistant Organisms (CROs)

WHO recommend eight IPC measures to prevent the spread of CROs. These eight measures are listed in **Table 41**.

**Table 41: Eight measures to prevent the spread of CROs**

| Recommendation | How |
|---|---|
| 1. Implementation of multimodal IPC strategies | Strategies should consist of at least the following:<br>• hand hygiene<br>• surveillance (in particular, for CRE)<br>• contact precautions<br>• patient isolation (single room isolation or cohorting)<br>• environmental cleaning |
| 2. Importance of hand hygiene compliance for the control of CRE-CRAB-CRPsA | • hand hygiene best practices according to the WHO guidelines on hand hygiene in health care should be implemented<br>• See chapter 3.1 Hand Hygiene |
| 3. Surveillance of CRE-CRAB-CRPsA infection and surveillance cultures for asymptomatic CRE colonization | • a) surveillance of CRE-CRAB-CRPsA infection(s) should be performed; and b) surveillance cultures for asymptomatic CRE colonization should also be performed, guided by local epidemiology and risk assessment.<br>• Populations to be considered for such surveillance include patients with previous CRE colonization, patient contacts of CRE colonized or infected patients and patients with a history of recent hospitalization in endemic<br>• See chapter 10: Surveillance |
| 4. Contact precautions | • contact precautions should be implemented when providing care for patients colonized or infected with CRE-CRAB-CRPsA |
| 5. Patient isolation | • patients colonized or infected with CRE-CRAB-CRPsA should be physically separated from non-colonized or non-infected patients using (a) single room isolation or (b) by cohorting patients with the same resistant pathogen |
| 6. Environmental cleaning | • Compliance with environmental cleaning protocols of the immediate surrounding area (that is, the “patient zone”) of patients colonized or infected with CRE-CRAB-CRPsA should be ensured. |
| 7. Surveillance cultures of the environment for CRE-CRAB-CRPsA colonization/ contamination | • surveillance cultures of the environment for CRE-CRAB-CRPsA may be considered when epidemiologically indicated. |
| 8. Monitoring, auditing and feedback | • monitoring, auditing of the implementation of multimodal strategies and feedback of results to health care workers and decision-makers.<br>• See table below: multimodal considerations for AMR prevention and control |

### 9.4 Considerations for AMR control and prevention in facilities with limited resources

- If no isolation rooms available consider cohorting i.e., the practice of grouping together patients (a cohort) who are colonized or infected with the same organism to confine their care to one area and prevent contact with other susceptible patients.
- Cohorts are created based on clinical diagnosis, microbiologic confirmation when available, epidemiology and mode of transmission of the infection agent
- If only soap and water are available for hand hygiene, then reinforce its use. However, hand sanitizers at the point of care as part of a multimodal strategy improve compliance with hand hygiene. This is especially applicable for high-risk areas/populations (Intensive Care Units, Dialysis, etc.).

Additional considerations

- IPC is one component of an effective strategy to combat AMR. Promoting the appropriate use of antimicrobials through a multidisciplinary antimicrobial stewardship programme will reduce morbidity, mortality and the economic burden of AMR..

**Table 42: Approach to using a multimodal strategy to combat AMR through IPC**

| | |
|---|---|
| System change – build it.<br>*(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)* | ▪ Put in place/maintain SOPs that support control of MDROs and identify additional budget needed to support IPC and antimicrobial stewardship efforts |
| Training and education – teach it<br>*(to improve health worker knowledge)* | ▪ Include AMR within IPC & WASH in-service training - use online WHO courses/e-learning – focus on standard & transmission-based precautions, hand hygiene, WASH |
| Monitoring and feedback – check it<br>*(to assess the problem, drive appropriate change and document practice improvement)* | • Perform AMR surveillance and monitoring to guide IPC interventions (at least quarterly) and to help detect outbreaks and perform timely feedback of results to HCWs and stakeholders and through national networks. This could include monitoring of consumption/usage of antimicrobial agents. |
| Reminders and communication – sell it<br>*(to promote the desired actions, at the right time, including campaigns)* | • Increase awareness on the role of IPC and WASH in AMR prevention through communication strategies, messages and materials to promote AMR awareness e.g., through support for annual antibiotic awareness week campaigns<br>• Use of alert sticker on the front of patient's notes & name of microorganisms inside the patient's notes to prevent breach of confidentiality |
| Culture and change – live it<br>*(to facilitate an organizational climate that values the intervention, with a focus* | ▪ Create an environment that facilitates and role MDRO management.<br>▪ Use champions/IPC link nurses and role models to raise awareness to actions to prevent MDROs. |

| | |
|---|---|
| *on involvement of senior managers, champions or role models)* | |

# Chapter 10: HAI Surveillance

Surveillance (of HAI) is the systematic collection, analysis, and interpretation of data on the frequency of disease. It is essential to the planning, implementation, and evaluation of public health practices and the timely dissemination of the data for public health action (prevention and control). Surveillance is an important part of an IPC programme. Findings from surveillance programmes should be used to understand the problem and then identify changes or interventions to prevent or manage the problem.

## 10.1 Purpose of surveillance

- Establishing baseline data on infection rates before implementing a change or intervention.
- Early detection of clusters and outbreaks
- Understand which pathogens are mostly causing HAIs.
- Identity antimicrobial resistance patterns
- Identifying important pathogens that might cause outbreaks.
- Identify high risk populations, procedures and exposures
- To detect cases of notifiable disease for reporting to the ministry of health.
- Assist with the implementation of Antimicrobial Stewardship programmes.
- Guide IPC strategy and interventions.
- To monitor the effectiveness of IPC interventions.

For ongoing HAI surveillance in Health facility (HFs), point prevalence studies should be conducted initially to establish a baseline. To prevent and reduce HAI, HCF must provide clear guidance and training for the placement of invasive devices to reduce the risk of HAIs.

It is important that surveillance data is shared with all stakeholders, including the IPC committee, unit managers, all clinical staff, and managers.

### 10.1.1 Methods of surveillance

The resources available for HAI surveillance will determine which surveillance method is most practical for an individual unit or facility. **Table 44** provides a summary of the different methods of surveillance.

**Table 43: Methods of Surveillance Summary**

| Surveillance Method | Description |
|---|---|
| Total surveillance | All cases from all wards, continuous |
| Targeted surveillance | Specific wards, specific pathogens, HAI types |
| Period prevalence | Continuous over a pre-specified period of time |
| Point prevalence | Single point in time, can be repeated |

| | |
|---|---|
| Laboratory surveillance | Based on pathogen identification |
| Clinical surveillance | Based on clinical signs/symptoms/syndromes, with or without laboratory data |

### 10.1.2 Who is responsible for Surveillance?

A multidisciplinary IPC team should be responsible for data collection, analysis, interpretation and dissemination of findings. Size and composition of the team will depend on availability and expertise of local staff, but it is preferable that the team consist of an IPC/hospital epidemiology physician, a microbiologist and a nurse lead with clinical experience. If no team is available the following people can be included: IPC practitioner or nursing personnel dedicated to IPC activities, link nurses, laboratory technologies/Lab Technicians, medical officer, clinical officers, public health officers, (if available).

In the instances where there are no teams responsible for surveillance, the IPC team lead can appoint a health personnel and trained to exercise the duties.

All members of the team must be trained on surveillance methods, data analysis and interpretation.

This team will need dedicated time for surveillance activities. responsibilities and training in hospital epidemiology/surveillance methods and regular supervision by the national IPC team to ensure that the data collected is of good quality.

It is critical to involve all stakeholders or at least to make them aware of the surveillance process and results, e.g., facility management, clinical and IPC staff.

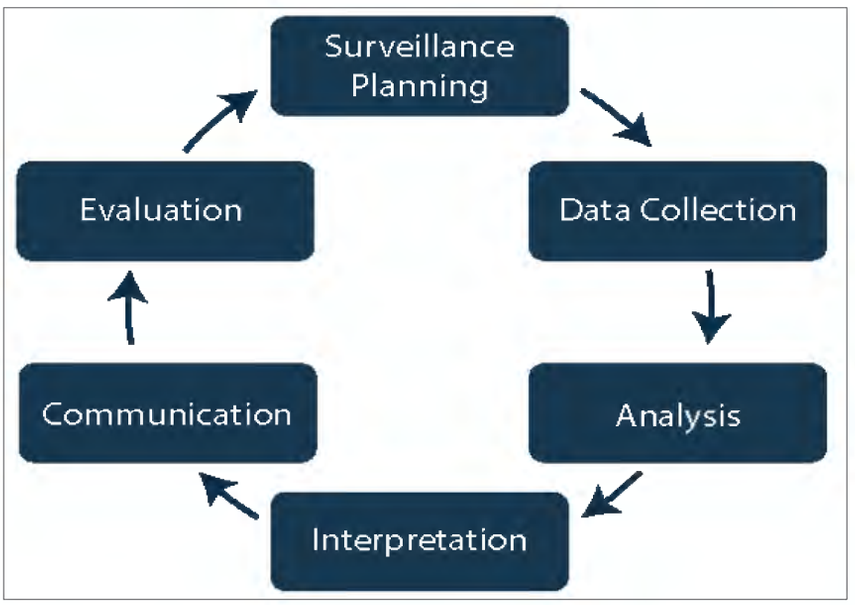
### 10.1.3 Steps for planning a surveillance system.

It is important to develop a written surveillance plan and the following should be included in the plan:

- Rationale for surveillance
- Population and targets
- Purpose, objectives and how the data will be used
- Surveillance team and their responsibilities
- Methodology: case definitions, numerator and denominator data sources, type of data collection
- Evaluation of data quality
- Reporting and feedback post implementation evaluation

**The steps of the surveillance system include the following (Figure 14):**

**Figure 14 Steps of surveillance**




1. **Surveillance planning**
   - Identity the target area to conduct surveillance
   - Assess the population to be surveyed.
   - Select the outcomes for surveillance.
     - Outcomes measures or process measures
   - Use established case definitions.
2. **Data collection**
   - What data will be collected?
   - Who will collect it?
   - Frequency of data collection.
   - What data sources will be used?
3. **Analysis**
   - Calculate and analyse surveillance rates
   - Apply risk stratification methodology
   - Interpretation of data
   - Interpret infection rates
4. **Communication**
   - Communicate information to all stakeholders
   - Use surveillance information to improve practice and to develop interventions to reduce rates
5. **Evaluation**
   - Continuously evaluate the surveillance system

In some instances, surveillance data may already have been collected as part of other surveillance programmes or ongoing quality improvement activities. Before beginning to collect data, find out whether the data is already being collected or if a similar surveillance system is already in place.

### 10.1.4 Classification of Infections

Infections can be classified as probable infections based on clinical signs and symptoms alone or they are considered as confirmed infections if there is laboratory confirmation of diagnosis. Infections can further be classified as healthcare-associated (HAI), or community acquired (or present on admission). Appropriate specimen collection is vital for classification and for differentiation between infection, colonisation and contamination. Correct classification further prevents inappropriate treatment with antibiotics. **Appendix 12** provides various SOPs for specimen collection of different samples.

#### Classification of HAIs

A healthcare-associated infection is defined as an infection that becomes clinically evident **48 hours after admission** to the facility (on or after the third calendar day of admission to the health facility where the day of admission is Day 1).

To establish the origin of HAIs, ensure that the following are recorded in the patient's record:

- History of the patient's previous HAI.
- Information on inter-facility transfer.
- The patient's admission date on the laboratory request form.
- No evidence that an infection was present or incubating at the time of admission to the healthcare facility or during the first two days after admission.
- Related to an intervention or procedure during admission.
- Includes infections acquired in the hospital but appearing within 48 hours after discharge.
- Within thirty (30) to ninety (90) days after surgery, depending on the type of surgery and whether an implant had been inserted.

#### When classifying HAIs

Consider the following when classifying infections.

- Repeat infection timeframe (RIT) is a 14-day period during which no new infections of the same type are reported, excluding surgical site infections. Additional pathogens cultured during the RIT for the same infection type are added to the existing infection and regarded as one infective episode.
- Infections occurring in newborn babies on the first two days after birth are not usually considered an HAI unless it is a known HAI pathogen such as *A baumannii*, *K pneumoniae,* or Methicillin resistant *Staphylococcus aureus* (MRSA).
- Classification of surgical wounds should be done during surgery as this will help determine the risk of SSI.

#### Device-associated infections

Infections where an invasive devise is inserted or has been inserted are classified as devices associated in infections. Examples of invasive devices are endotracheal tubes, central lines or in dwelling urinary catheters. The following criteria is important in order to be classified as a HAI:

- The device was in place for more than two calendar days prior to the infection.
- An HAI occurring on the day of discontinuation of the device, or the following calendar day is considered a device-associated infection if the device had already been in place for more than two calendar days.

**Types of HAIs**

The following are examples of the most common types of HAIs.

- Primary blood stream infections (BSI),
- Central line-associated bloodstream infections (CLABSI),
- Peripheral line-associated bloodstream infections (PLABSI),
- Catheter-associated urinary tract infections (CAUTI),
- Surgical site infections (SSI), and
- Ventilator-associated pneumonias (VAP)

**Standardised case definitions for HAIs**

Ideally, international standardized HAI case definitions should be used to ensure reliability and consistency with other surveillance programmes. HAI surveillance can be particularly challenging in low- and middle-income countries (LMICs) because of a lack of dedicated human resources, funds and expertise in epidemiology and IPC. Standardized case definitions can be complex and difficult to apply, particularly in low-resource settings due to:

- Limited expertise and/or skills for data interpretation and use
- Lack of reliable microbiological and other diagnostic tools
- Poor quality information from patient records.

If low-resource settings wish to adapt international HAI case definitions, it is critical to ensure:

- That established experts in surveillance can help guide adaptation.
- That adapted case definitions are validated.
- Understanding that benchmarking or comparison with other countries will be challenging.

Case definitions are based on:

- Clinical signs and symptoms
- Laboratory investigations
- Radiological investigations

The definitions of the US CDC have been adapted widely and are used to classify infections as HAI or community acquired (present on admission).See **Table 45**.

Starting with surveillance of process and structure indicators can be a valid initial approach until there is sufficient infrastructure and resources for HAI surveillance.

It is further recommended to use a standardise data collection tool to assist with gathering of information. See **Appendix 13** for an example of a data collection tool.

**Table 44 Standardised case definitions for HAIs**

| Primary bloodstream infections |
|---|
| BSI case definition: The BSI is NOT related to an infection at another site, and it meets one of the following criteria:<br>Criterion 1: Recognised pathogen cultured from at least one blood culture, unrelated to infection at another site. OR<br>Criterion 2: At least one of: fever (>38°C core), chills, hypotension.<br>If aged < 1 year: fever (>38°C core), hypothermia (<36°C core), apnoea, or bradycardia AND common skin contaminant cultured from > 2 blood cultures drawn on separate occasions (within 48 hours of each other), or at different sites, unrelated to infection at another site. |
| Central line-associated bloodstream infections |
| Central line: an intravascular catheter that terminates at or close to the heart or in one of the great vessels (aorta, pulmonary artery, superior & inferior vena cava, brachiocephalic veins, internal jugular veins, subclavian veins, external iliac veins and common iliac or femoral veins; in neonates: umbilical artery or vein). Must be a lumened device which is used for infusion, withdrawal of blood or hemodynamic monitoring. May be temporary or permanent (e.g., dialysis tunnelled or implanted catheters, including ports)<br>CLABSI is a laboratory-confirmed bloodstream infection where a central line or umbilical catheter was in place for more than two days prior to the development of signs and symptoms of infection.<br>AND<br>A central line or umbilical line was in place on the date of the event (when infections were<br>diagnosed or identified) or the day before.<br>If a central line or an umbilical line was in place for more than two days and then removed, the classification of such infection must refer to the day of removal of the line or the next day. |
| Peripheral line-associated bloodstream infections |
| A peripheral line was in place on the date of the event or the day before.<br>Patient has at least 1 of the following signs or symptoms: fever (>38°C), pain, erythema, or heat<br>at the involved vascular site.<br>Patient has purulent drainage at involved vascular site.<br>Report infections of an intravascular annulation site without an organism cultured from blood as Phlebitis.<br>Report intravascular infections with organisms cultured from blood as Peripheral line bloodstream infection (PLABSI) |
| Catheter-associated urinary tract infections |
| Indwelling catheter: A drainage tube that is inserted into the urinary bladder through the urethra AND is left in place AND is connected to a closed drainage system *(straight in-and-out catheters, condom catheters and supra-pubic catheters are not included in the definition.)*<br><br>CAUTI is an infection where an indwelling urinary catheter was in place for more than two days prior to the first signs and symptoms of infection OR should signs and symptoms of infections are not present, there is a positive urine culture of more than 100,000 CFU/ml with no more than two species of urine pathogens.<br>OR |

An indwelling catheter was in place for more than two days and then removed.
Clinical signs and symptoms of infection are present on the day of removal of the catheter or
from the next day in order to the infection to be classified as a CAUTI

## Surgical site infections

Surgical site infection is defined as an infection that occurs within 30 after surgery or within 90 if an implant is inserted. It involves the skin and subcutaneous tissue of the incision *(superficial incisional)* and/or the deep soft tissue (for example, facia, muscle) of the incision *(deep incisional)* and/ or any part of the anatomy (for example, organs and spaces) other than the incision that was opened or manipulated during an operation *(organ/space).*[161]

NOTE: where decontamination of medical devices and operating theatre facilities are suboptimal, surgery associated infections should be considered.

There are 3 categories of SSIs:
Superficial Incisional Infection – involves only skin and subcutaneous tissue of incision. Patient has at least 1 of the following:
Purulent drainage from superficial incision.
Microbes isolated from aseptically obtained culture of fluid or tissue from superficial incision.
Superficial incision that spontaneously dehisced or was deliberately opened by a surgeon and is culture-positive or not cultured (a culture-negative finding does not meet the criterion for a SSI) AND Patient has at least 1 of the following sign and symptoms:
Pain/tenderness, localized swelling, redness or heat.
Diagnosis of SSI by surgeon or attending doctor.
Deep Incisional Infection - involves deep soft tissues of the incision (i.e., fascial and muscle layers) Patient has at least 1 of the following:
Purulent drainage from deep incision.
Deep incision that spontaneously dehisces or deliberately opened by surgeon & is culture positive or not cultured. (A culture negative finding does not meet criterion.) AND patient has at least 1 of the following signs and symptoms: - fever (>38°C) - localized pain or tenderness
Abscess or other evidence of infection involving deep incision found on direct exam, during invasive procedure, or by histopathologic exam or imaging test.
Diagnosis of SSI by surgeon or attending doctor.

Organ/Space Surgical Site Infection - involves any part of the body excluding the skin incision, fascia or muscle layers that is opened or manipulated during the operative procedure. Patient has at least 1 of the following:
Purulent drainage from drain that is placed into the organ/space.
Organism isolated from an aseptically obtained culture of fluid or tissue in the organ/space.

## Ventilator associated Pneumonia

Ventilator: a device to assist or control ventilation continuously through an endotracheal tube or tracheostomy (hence occurs in critical care/high care units).

Lung expansion devices like intermittent positive pressure breathing (IPPB) or nasal positive end-expiratory pressure (PEEP) or continuous nasal positive airway pressure (CPAP) are NOT considered ventilators unless delivered via an endotracheal tube or tracheostomy.

VAP is a condition identified when the patient is on mechanical ventilation, delivered via and endotracheal tube or for more than two days (if the patient is admitted or transferred into the nursing unit, already intubated and ventilated, the day of admission is considered as day one).
AND

| |
|---|
| The diagnosis of VAP is based on a combination of clinical, radiological and microbiological criteria.<br>Radiological: Chest X-Ray with diffuse/patchy infiltrates or localised infiltrates. One X-ray if no<br>underlying cardiac or pulmonary disease otherwise 2 X CXR.<br>Pulmonary: Onset of purulent sputum, worsening gas exchange, cough or dyspnoea or tachypnoea.<br>Systemic: Fever of > 38°C with no other known cause.<br>Microbiology: Pus cells: moderate to many; Organisms moderate to many (and consistent with gram stain). |

### 10.1.5 How to calculate HAI rates.

It is important that a consistent standardised method should be used to calculate HAI rates. **Table 45** provides examples of the calculating of rates for different device-associated infections.

HAIs can be calculated in the following ways:

**Incidence rate**: the number of new cases are counted, divided by the person time of the population at risk e.g., device days or patient days. The answer is displayed as a rate per 1000 device days or patient days.

**Incidence:** the number of new infections during a specific period divided by the persons at risk during the same period: e.g., number of admissions, number of surgeries, number of devices The answer is displayed as a percentage.

**Rate** is an expression of the frequency with which an event (e.g., an infection) occurs in a defined population over a given time period. Rate always includes time as a part of its expression.

**There are three important things to remember when calculating a rate:**

- The numerator and denominator must reflect the same population—cases that are in the numerator must also be counted in the denominator.
- All cases in the denominator are eligible to be considered for the numerator.
- Counts in the numerator and denominator must cover the same time period

**Table 45: How to calculate HAI rates.**

| Central line-associated bloodstream infection (CLABSI) rate |
|---|
| CLABSI rates are calculated by dividing the total number of new CLABSI cases by the total number of central line days.<br><br>This number must be multiplied by 1000 to get an incidence rate per 1000 central line days.<br><br>Number of CLABSI infections x 1000<br>Total number of central line days = rate of CLABSI infection/1000 central line days<br><br>Counting central line days:<br>Central line days are counted from the day of insertion of the device (day one) until the date of removal. Every day that the device is in situ needs to be counted to identify the total number of device days. |

Only one central line per patient is counted per calendar day regardless of the number of central lines present (e.g., a CVP line and a dialysis catheter in situ).

All central lines on inpatient units should be included in device day counts regardless of whether they are being accessed (e.g., being utilised for an infusion or hemodynamic monitoring).

If a central line is removed and re-inserted on the same day, the central line day count should be continued. If more than one calendar day passes before a new central line is inserted, the count should start from one again.

**Peripheral line-associated bloodstream infection (PLABSI) rate**

Incidence: Calculated by the number of peripheral lines inserted over a period of time, such as one month, divided by the number of peripheral sites recorded as infected x 100. The result is expressed as a percentage.

Number of PLABSI infections x 100
Total number of peripheral lines inserted = infection rate as a percentage

**Catheter-associated urinary tract infection (CAUTI) rate**

CAUTI rates are calculated by dividing the total number of CAUTIs by the total number of catheter days. This number must be multiplied by 1000 to get a rate per 1000 catheter days.

No of CAUTI infections x 1000
Total number of catheter days = rate of CAUTI infection/ 1000 catheter days

Counting catheter days
Catheter days are counted from the day of insertion of the device (day one) until the date of removal. Every day that the device is in situ needs to be counted to identify the total number of device days.
If a catheter is removed and re-inserted on the same day, the catheter day count should be continued. If more than one calendar day passes (i.e., the next day) before a new catheter is inserted, the count should start again from one.

**Surgical site infection rate**

SSI rates are calculated by dividing the total number of SSIs by the total number of operative procedures (or by category of operation).
This number must be multiplied by 100 to get a rate per 100 operative procedures.

No of SSI infections x 100
Total number of operative procedures= rate of SSI infection/ 100 operative procedures

**Ventilator-associated pneumonia (VAP)**

VAP rates are calculated by dividing the total number of VAP cases by the total number of ventilator days. This number must be multiplied by 1000 to get a rate per 1000 ventilator days.

No of VAP cases x 1000
Total number of ventilator days = rate of CAUTI infection/ 1000 ventilator day
Ventilator days are counted from the day of insertion of the device (day one) until the date of removal. Every day that the device is in situ needs to be counted to identify the total number of device days.

In summary surveillance can measure the outcome of a problem or the process which can prevent or correct a problem.

**What to measure during surveillance**

**Outcomes and process measures**

It is important to decide what is going to be measured with surveillance. It can either be a process or an outcome**. Table 46** provides an overview of the different between outcomes and process measure, the advantages of each and examples of each measure.

**Table 46: Process and Outcomes Measures**

| Outcome Measure | Process Measure |
|---|---|
| The final result<br>The final product | How the systems works<br>Structures and physical environment: equipment and infrastructure |
| Advantage<br>• Represent the desired end.<br>• Measures results of healthcare | Advantage<br>• Validate process of care measures<br>• Provide an important additional element to quality improvement efforts.<br>• Show which provider actions could be changed to improve patient outcomes, mostly with smaller sample/population size |
| • HAI rates<br>• CAUTI rates<br>• CRE colonization<br>• SSI rates<br>• Sharps injuries<br>• TB infection rates in health workers | • HAI rates<br>• CAUTI rates<br>• CRE colonization<br>• SSI rates<br>• Sharps injuries<br>• TB infection rates in health workers |

Note: Routine environmental sampling is not indicated, except when a source has to be confirmed during an outbreak.

### 10.1.6 Outbreaks

One of the advantages of a well-functioning surveillance programme is that outbreaks are detected timeously. The following section addresses the management of outbreaks, with a focus on HAI outbreaks in HFs. However, since the principles of IPC apply to all outbreaks, should it be necessary, IPC support to community outbreaks may be offered.

Prevention and control of epidemic-prone communicable diseases remains a priority. Again, the emergence of unknown/novel pathogens and re-emergence of infectious diseases of epidemic/pandemic potential, continue to pose a threat to the health of our communities. To contain and minimise their impact, alertness and epidemic preparedness is critical. The MoH National Technical Guidelines for Integrated Disease Surveillance and Response aim to assist health workers responsible for communicable diseases control in improving epidemic preparedness and rapid response strategies to reduce morbidity, mortality and disability due to infectious diseases.

For further details on the roles and responsibilities of outbreak response teams/committees and the process to follow to investigate disease outbreaks. Refer to the MoH National Technical Guidelines for Integrated Disease Surveillance and Response.

**What is an outbreak?**
An outbreak is the occurrence of more cases of an infectious disease or MDR pathogen than would normally be expected for a particular time, place or population. For most outbreaks, two or more people with the same symptoms occurring in the same area and time, may be linked. In certain circumstances, even one case of a life-threatening disease is considered an outbreak, e.g., meningococcal meningitis or viral haemorrhagic fever.

**Steps for investigating an outbreak**
The purpose of outbreak investigation is to identify the source of the outbreak and to guide public health efforts or interventions to prevent further spread of the outbreak. Outbreaks also provide opportunities to train health workers and to implement quality improvement projects to improve patient outcomes. **Figure 15** depicts the steps to follow for the investigation of an outbreak.

The following section describes the steps to follow for the investigation of outbreaks:

- **Prepare for the investigation – form a team:**

All role players should be informed and includes the following stakeholder: facility management, department of health, laboratories, clinicians, casualty and the community. A small core group of people (the outbreak team) should be formed to plan the investigation.

- **Confirm the existence of an outbreak:**

Develop a case definition that includes both clinical signs and symptoms (time place, person). Laboratory tests should be included if possible.

- **Establish the diagnosis:**

Use all clinical and laboratory data to assist with identifying the suspected pathogen. For all cases, send appropriate clinical samples for laboratory investigation.

- **Search for additional cases:**

Prepare a line list or Gantt chart of all individuals meeting the case definition. A Gantt chart is useful to track patient movements, procedures, samples submitted and disease outcomes in hospital outbreaks.

- **Characterise (describe) the cases:**

Use the demographic details from affected cases to build up a profile of who is at risk of developing this infection. Where possible, draw an epidemic curve to track new cases and when they occur.

- **Put immediate control measures in place:**

Intensify IPC measures, e.g. hand hygiene and environmental cleaning or; and remove suspected sources of infection.

- **Formulate a hypothesis**

Analyse all the information collected to date and put together a hypothesis (theory) that would explain the disease for most of the affected cases. It might be possible that not all cases are caused by the same pathogen and that there is more than one outbreak occurring at the same time.

**Test your hypothesis:**

- Most outbreak investigations do not reach this stage, as the interventions implemented often stop ongoing transmission. If this step is required, get help to perform further research on the problem.
- **Communicate your findings:**

Identify a single member of the outbreak team to interact with the facility, the community and sometimes even the local media! It is vital to communicate progress and findings to all stakeholders and the public, as there is often a degree of panic and misinformation associated with outbreaks. Once the outbreak is over, summarise the investigation, make recommendations for prevention of future outbreaks and share the report widely.

**Figure 15 Steps for investigating an outbreak.**


Once the final steps in the investigation process is completed, and the source of the outbreak has been determined, it is vital to share learnings, review practices and revise SOPs accordingly.

**The role of the IPC practitioner during an outbreak**

The IPC practitioner plays a key role in the investigation and the implementation of interventions to contain the outbreak must be included in the outbreak team. The IPC practitioner is usually involve in the following activities:

- Collection of clinical specimens
- Interpretation of results
- Compiling a line list or Gantt chart
- Evaluation and implementation of IPC measures
- Initiation of enhanced surveillancee into other areas
- Review of facility policies
- Education of health workers regarding outbreak control measures

## Investigating and managing an outbreak must be a team effort.!!!!

**Considerations for HAI surveillance in facilities with limited resources**

If no dedicated hospital IPC team is available, surveillance can be done by:

- nursing personnel dedicated to IPC;
- IPC link nurses or practitioners of other disciplines as relevant (e.g., surgeons, pharmacists);
- those in other existing surveillance systems; and epidemiology/biostatistics support staff (e.g., initial training, ongoing supervision visits from national level).
- It is accepted that some aspects of the methods and tools to be used may need further adaptation according to local circumstances and resources, e.g., paper systems rather than the gold standard electronic database.
- Balancing patient numbers and the resources available should be a consideration when resources are limited. A larger number of subjects provide more accurate results, however, the question regarding which types of operations to enrol in SSI surveillance, and when, should be a decision reached by local health care institutions.
- Consideration should also be given to assessing the type of data needed to be available at the national level, both ideally and as a minimum.
- If due to resources, for example CRO surveillance is not in place, a point prevalence study can be undertaken. This step helps to evaluate the laboratory capacity for establishing ongoing surveillance, as well as the implications in terms of financial and human resources, equipment procurement, etc.
- Process indicators can be a good place to start until infrastructure and resource building has taken place.

**Additional considerations**

- Good quality microbiological laboratory support is a very critical factor an effective IPC programme which includes surveillance. Good quality microbiological support provided by at least one national reference laboratory is a critical factor for an effective national IPC surveillance programme.
- Provide patient information on the reason for screening and clearly explain what will happen to them including follow up.
- On discharge: Every patient should receive a discharge note indicating whom they are to contact the facility if they have issues before the follow up dates.

**Table 47: Improving Surveillance Through a Multimodal Strategy(MMS).**

| | |
|---|---|
| **System change – build it (the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)** | • Put in place/improve laboratory capacity and diagnostic stewardship to reliably conduct surveillance<br>• Put in place/improve a sustainable system to reliably procure and deliver microbiology laboratory equipment, tests and reagents. Through MoHS budget allocation<br>• Develop SOPs describing appropriate procedures for surveillance and screening. Reinforce capabilities and procedures for sample management and (if needed) sample storage and transport to a reference laboratory (off-site). |
| **Training and education – teach it (to improve health worker knowledge)** | • Assess local training needs especially for sample collection and identification in the laboratory and antibiogram interpretation.<br>• Put in place/improve a reliable mechanism for producing/using updated training resources and information for staff with a focus on the importance of diagnostics and diagnostic stewardship, the most appropriate laboratory methods, specimen collection, management (processing-storage-transport), use of microbiological results to establish appropriate IPC measures<br>• Educate health care workers to deal with the ethical implications of screening, as well as how to interact with patients and collect samples with tact and discretion. |
| **Monitoring and feedback – check it (to assess the problem, drive appropriate change and document practice improvement)** | • Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) regarding: Reliable availability of microbiology laboratory equipment tests and reagents;<br>• compliance with surveillance and screening SOPs/protocols;<br>• documentation processes;<br>• efficiency of the surveillance system. |
| **Reminders and communication – sell it (to promote the desired actions, at the right time, including campaigns)** | • Identify and put in place effective and rapid mechanisms to communicate about a patient's colonization/ infection status at the point of care, for example, electronic reminders/alerts, other flagging systems (on admission/discharge/ readmission), taking account of the need to address cultural aspects and local languages.<br>• Use data from surveillance to communicate about the importance of the problem and of action for improvement.<br>• Flag the infection status of the patient in the clinical chart or the electronic record and link it to IPC activities and antibiotic therapy prescription for appropriate action.<br>• Present infection/screening results in a range of formats.<br>• Highlight unnecessary screening and surveillance activities |
| **Culture and change – live it (to facilitate an organizational climate that values the intervention, with a focus on involvement** | • Discuss HAI surveillance results with senior management by providing data on epidemiology and costs, but also patient stories, to highlight it as a serious patient safety issue that requires tangible action - first of all in the ability of the facility to reliably detect it.<br>• Motivate senior clinicians and nurses to follow SOPs for surveillance and screening by using role models to explain the importance of the |

| | |
|---|---|
| **of senior managers, champions or role models)** | problem and the implications of surveillance for prevention and control as well as for correct antibiotic treatment.<br>• Identify champions to promote and role model SOPs for surveillance and screening.<br>▪ Promote clinical discussion on the importance of surveillance. |

## 10.2 Blood Stream Infections

**Key practice points:**

- Avoid use of a peripheral or central venous cannula if possible
- Use sterile equipment and aseptic technique during insertion, maintenance and removal
- Review the need for the cannula daily and remove as soon as possible when no longer needed
- Hand hygiene is critical (especially moment 2 before an aseptic/clean procedure and moment 3 after blood and body fluid exposure)

**Why IPC is important for BSI prevention.**

Mortality due to cannula bacteraemia is highly variable, but it could be as high as 60% for *Pseudomonas aeruginosa* or *Candida* infection and about 8–10% for *Staphylococcus aureus*. It is estimated that 30–80% of patients receive a peripheral line during their hospital stay - one of the most common invasive procedures performed in the hospital. The most common adverse event from using peripheral lines is phlebitis, or thrombophlebitis if associated with an intravascular thrombus. The hand is the main driver of cannula related BSIs, not only by bringing microorganisms to the patient but also by putting the patient's microorganisms into the catheter (due to lack of antiseptic technique). Strict adherence to aseptic technique during insertion and best practices for maintenance, removal and associated therapy can reduce negative clinical outcomes.

### 10.2.1 How and when to prevent Blood Stream Infections

Table 48 lists best practices for BSI prevention during insertion, maintenance and removal of peripheral and central venous cannula.

**Table 48: Best practices for inserting maintaining & removal of peripheral and central venous catheters.**

| Prevention of BSI – Peripheral IV cannula | |
|---|---|
| **Placement** | **Maintenance & removal** |
| • Cannulation only if clinically indicated (never for convenience) | • Review the need of IV cannula and remove if no longer required |
| • Prepare a tray of items required for catheter placement | • Keep the dressing clean and dry – can stay for up to72 to 96hrs. |
| • Perform hand hygiene (moment 2 and 3) and use sterile gloves when placing the cannula only. | • Use an aseptic technique for ongoing daily cannula care |
| • Use an aseptic non-touch technique following the procedure for insertion of a peripheral cannula | • Change the dressing if wet or soiled or immediately after administration of blood. |
| • Clean site with an antiseptic and let dry before cannulation.<br>• If site is visibly dirty, wash with soap and water before applying the skin antiseptic. | • Replace the IV cannula whenever cannula related complications occur (occlusion, phlebitis or infection). If required, insert a new cannula at an alternate site. |
| • Use sterile transparent dressing or sterile gauze dressing if not available. | • Perform hand hygiene (moment 3 or 4). |
| • Secure cannula to prevent any unnecessary movement | • Perform hand hygiene |

| Prevention of BSI – Peripheral IV cannula | |
|---|---|
| **Placement** | **Maintenance & removal** |
| • Note the date of cannula insertion | |
| **Prevention of BSI – Central venous catheter** | |
| Prepare a tray of items required for catheter placement. Always use sterile items and equipment. | Daily review the need for the catheter and remove if no longer required or infection is suspected. |
| Use single lumen unless indicated otherwise. | Keep dressing clean and dry. |
| Use aseptic technique during insertion. | Change dressing if it becomes wet, soiled or loosened. |
| Clean site with an antiseptic and let it dry before insertion | Use an aseptic non-touch technique for ongoing daily cannula care |
| Secure catheter with suture or clips to prevent unnecessary movement. | Wear gloves for dressing change or exit site care. |
| Use sterile transparent dressing or sterile gauze, if transparent dressing is not available. | Always disinfect the needless access devices and manipulate open hubs with gauze (soaked in alcohol) |
| Protect insertion site from outside contamination. | Always prepare infusates using aseptic technique. |
| Note the date of catheter insertion. | |

**Procedure for insertion of a peripheral and central venous catheter**

Refer to the WHO e-Learning module available at: https://ipc.ghelearning.org

### 10.2.2 Considerations in facilities with limited resources

- Rational and safe use of cannulation only when clinically indicated addresses some of the challenges related to availability of supplies.
- Considerations related to hand hygiene and PPE use in facilities with limited resources can be found in chapter 3.1 and chapter 3.2 respectively.

**Additional considerations**

- If dressings are removed to inspect the site discard the removed dressing appropriately and use a new one.
- If there is resistance to withdrawal of blood or injection of drugs through an intravascular catheter do not use force. The catheter likely needs replacement.
- For peripheral IV lines avoid using the lower limbs if possible as these are more likely to become infected.
- Ensure waste is properly disposed of during insertion, maintenance and removal with special attention to any sharps.
- Document clinical observations of insertion site post-insertion, during daily review and upon removal in the patient record

**Table 49: Approach to using a multimodal strategy for BSI prevention.**

| | |
|---|---|
| System change – build it<br><br>*(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)* | • Ensure the necessary infrastructure and resources to enable measures to prevent BSI (e.g., appropriate catheter material and type, adequate staffing, pre-prepared cannula insertion kits, PPE, hand hygiene supplies, catheter securing devices, etc.)<br>• Good infrastructure and available resources can streamline interventions for consistent care and make implementation easier and safer.<br>• Availability and access to guidelines, policies and procedures for staff |
| Training and education – teach it<br><br>*(to improve health worker knowledge)* | • Ensure that practical training and education methods are aligned with the recommendations for BSI prevention. Insufficient knowledge – particularly of BSI recommendations based on scientific evidence and why they are important – is a major obstacle to change.<br>• Use onsite courses, simulations and videos, group discussions, bedside training, e-learning |
| Monitoring and feedback – check it<br><br>*(to assess the problem, drive appropriate change and document practice improvement)* | • Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) related to catheter insertion and maintenance as a key process indicator. Evaluate regularly and report results in a timely manner.<br>• Monitor BSI e.g., as part of a programme of surveillance for device-associated infections and provide feedback to wards and departments |
| Reminders and communication – sell it *(to promote the desired actions, at the right time, including campaigns)* | • Use visual protocols relating to insertion and make available at the point of care and where the procedure takes place. In addition, use posters to act as reminders for daily review of the need for catheterisation, posters addressing hand hygiene in the context of cannula (PVC and CVC), brochures, organizational charts, infographics as appropriate<br>• Communicate with patients and their visitors about the need for a cannulas and prevention methods. |
| Culture and change – live it<br><br>*(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)* | • Create an environment and perceptions that facilitate awareness of BSI prevention at all levels. Nurture a climate that understands and prioritizes safety and IPC issues. The culture of a hospital influences how teams work together and how valued people feel – and how they perform day to day. It can influence staff perceptions of their ability to make a change – e.g., to safer, evidence-based practices<br>• Clinical leads should act as role models. Managers should ensure budgets are made available for necessary equipment and supplies including hand hygiene materials and support quality improvement. |

### 10.3 Catheter Associated Urinary Tract Infections (CAUTI)

**Key practice points:**

- Avoid urinary catheterization if possible.
- When feasible, use a two-person team to perform insertion.
- Use sterile equipment and aseptic technique during insertion and aftercare/maintenance.
- Review the need for the catheter daily and remove as soon as possible when no longer needed (ideally within 48 hours).
- Perform hand hygiene is critical (especially moment 2 before an aseptic/clean procedure and moment 3 after blood and body fluid exposure).
- Don't change the catheter routinely if it is functioning properly.
- Maintain closed drainage.
- Bladder irrigation/washout and use of antiseptics/antimicrobial agents does not prevent CAUTI: do not use.
- Empty drainage bag regularly into a clean receptacle used only on one patient.

### 10.3.2 Why IPC is important for CAUTI prevention?

- Urinary catheterization is the most common cause of HAI with 70–80% of urinary tract infections (UTIs) attributable to indwelling urethral catheter use but as many as 65–70% of CAUTI cases are preventable.
- Potentially harmful microorganisms can be introduced during insertion and ongoing maintenance of the catheter.
- Complications associated with CAUTI cause discomfort to the patient and prolonged hospital stays, and increase costs and mortality.
- The key risk factor for CAUTI is the length of time a catheter is in situ with a 3–7% increased risk with each day a catheter remains.

**How and when to prevent CAUTI**

Table 50 lists the measures to be taken to prevent CAUTI at the time of insertion and during ongoing maintenance of the catheter.

***Table 50: Preventing CAUTI***

| Prevention of CAUTI | |
|---|---|
| During insertion | During ongoing maintenance |
| Catheterize only if clinically indicated (never for convenience) | Review urinary catheter necessity daily and remove promptly. |
| Use a closed urinary drainage system | Maintain a closed draining system. If a urine specimen is required, take specimen aseptically via the sampling port - disinfect port by wiping with a 70% alcohol swab & perform hand hygiene (moments 2 & 3) |
| Use an aseptic non-touch technique (sterile gloves and equipment) following the procedure for insertion of a urinary catheter below | Use an aseptic technique for ongoing daily catheter care |
| | Do not change the catheter routinely if it is functioning properly |
| | Empty the drainage bag regularly into a clean receptacle used only on one patient and perform hand hygiene before and after (moments 2 & 3) |
| | Correctly position drainage bag below the level of the bladder (and never on the floor) to prevent back flushing<br>In case of need e.g., during transportation, clamp the urinary bag tube to prevent backflow. |
| | Perform daily meatal hygiene with soap and water only – involve the patient in their care |

**Procedure for insertion of a urinary catheter**

Refer to the WHO animation video: https://youtu.be/7a4aNFJoZdQ

Refer to Appendix 15 for a step-by-step outline of urinary catheterization.

### 10.3.3 Considerations in facilities with limited resources

- When collecting samples, if the sampling port is not available, the sample can be aspirated from the connecting tube using a sterile small-bore needle/syringe and transferred into a sterile container (this is not best practice).
- If a specimen is required, the specimen should be transported to the lab within two hours or refrigerated. If a refrigerator is not available, use a dedicated ice box, or add boric acid as a preservative.
- Considerations related to standard precautions and hand hygiene in particular in facilities with limited resources can be found in chapter 3 and 3.1 respectively.

### Additional considerations

Patients with indwelling urinary catheters do not need antibiotics (including for asymptomatic bacteriuria), unless they have a documented infection. Bladder irrigation/washout and use of antiseptics/antimicrobial agents does *not* prevent CAUTI and should not be used.

***Table 51: Approach to using a multimodal strategy for prevention of CAUTI***

| | |
|---|---|
| System change – build it.<br><br>*(The system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)* | • Ensure the necessary infrastructure and resources to enable measures to prevent CAUTI (e.g., appropriate catheter material and type, adequate staffing, pre-prepared CAUTI insertion kits, PPE, hand hygiene supplies, urinals, bedpans, catheter securing devices, lubricating gel (single- vs multi-use), gloves<br>• Good infrastructure and available resources can streamline interventions for consistent care and make implementation easier and safer.<br>▪ Availability and access to guidelines, policies and procedures for staff |
| Training and education – teach it<br><br>*(to improve health worker knowledge)* | • Ensure that practical training and education methods are aligned with the recommendations for CAUTI prevention. Insufficient knowledge – particularly of CAUTI recommendations based on scientific evidence and why they are important – is a major obstacle to change.<br>▪ Use on site courses, simulations and videos, group discussions, bedside training, e-learning) |
| Monitoring and feedback – check it<br><br>*(To assess the problem, drive appropriate change and document practice improvement)* | • Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) on compliance with catheter insertion and maintenance as a key process indicator. Evaluate regularly and report results in a timely manner. Use checklists, algorithms, monitoring forms e.g., WHO hand hygiene observation tools, CAUTI surveillance systems, Stop orders<br>• Monitor CAUTI e.g., as part of a programme of surveillance for device-associated infections and provide feedback to wards and departments |
| Reminders and communication – sell it *(to promote the desired actions, at the right time, including campaigns)* | • Use visual protocols relating to insertion and make available at the point of care and where the procedure takes place. In addition, use posters to act as reminders for daily review of the need for catheterization, posters addressing hand hygiene in the context of CAUTI, brochures, organizational charts, infographics as appropriate<br>• Communicate with patients and their visitors about the need for a urinary catheter and prevention methods. |
| Culture and change – live it<br><br>*(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)* | • Create an environment and perceptions that facilitate awareness of CAUTI prevention at all levels. Nurture a climate that understands and prioritizes safety and IPC issues. The culture of a hospital influences how teams work together and how valued people feel – and how they perform day to day. It can influence staff perceptions of their ability to make a change – e.g., to safer, evidence-based practices<br>• Clinical leads should act as role models. Managers should ensure budgets are made available for necessary equipment and supplies including hand hygiene materials and support quality improvement. |

## 10.4 Ventilator Associated Pneumonia/Healthcare Associated Pneumonia

**Key practice points:**

- Avoid use of mechanical ventilation whenever possible.
- Use sterile equipment and aseptic technique during insertion, maintenance and removal of mechanical ventilation.
- Perform hand hygiene (especially moment 2 before an aseptic/clean procedure and moment 3 after blood and body fluid exposure).
- Daily assessment of sedation and readiness to extubate.
- Use of PPE as appropriate when performing suctioning care activities and perform associated hand hygiene action.

### 10.4.1 Why IPC is important for HAP/VAP prevention?

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 follow 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.

**How and when to prevent HAP & VAP**

Table 52 lists best practices for HAP & VAP prevention during placement and maintenance of mechanical ventilation.

**Table 52: Best practices for prevention of HAP & VAP**

| **HAP prevention best practices** | |
|---|---|
| • Strict adherence to hand hygiene (see Hand Hygiene chapter for more details). | |
| • Performing routine oral care | |
| • Early mobilization (i.e., post-surgery) | |
| • Treatment of dysphagia | |
| • Swift diagnosis | |
| **VAP (mechanically assisted) prevention best practices** | |
| **Placement** | **Maintenance** |
| • Consider use of non-invasive ventilation when possible.<br>• Insert endotracheal tube (ET) only for appropriate indication. | • Daily assessment of sedation with readiness extubate. |
| • Perform hand hygiene (moment 2 and 3) | • Perform hand hygiene (moment 2, 3, or 4) and aseptic technique |
| • Ensure appropriate size of ET is used. | • Unless contraindicated, keep the head of the patient's bed elevated at $30^0$-$45^0$ – avoid laying the patient completely flat. |
| • Ensure only properly trained HCWs perform the procedure. | • Oral hygiene: Brush 12 hourly with standard toothpaste, and clean mouth with chlorhexidine gluconate (≥ 1– 2% gel or liquid) 6 hourly. |
| • Use aseptic technique and sterile equipment for insertion. | • Education and training of staff in appropriate airway management. |
| • Set (and maintain) appropriate ET cuff pressure between 20-30 cm H2O (or 2 cm H2O above peak aspiratory pressure). | Cuff pressure control and monitoring 6-hourly |
| | • Avoid routine change of ventilator circuit, humidifiers and endotracheal. |
| | • Use sterile water in humidifier and maintain appropriate humidification of inspired gas. |
| | • Perform subglottic suctioning of respiratory secretions. |

**Considerations in facilities with limited resources**

- As best as possible, always ensure air flow through ventilation of the care area to help diminish transmission risks.
- Considerations related to standard precautions and hand hygiene in particular in facilities with limited resources can be found in chapter 3 and 3.1 respectively.

## Additional considerations

- 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
- If reusable breathing circuits are used, they must be cleaned and appropriately decontaminated between patients according to the manufacturers' guidance and by the HCF central sterilization services department. 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 decontamination and reuse.
- Discard waste appropriately (refer to chapter 3.6).
- Avoid prolonged use of nasal gastric tubes for feeding.
- Feed small, frequent amounts rather than large amounts at one time.
- Ensure patients stop taking solid foods 4-6 hours prior to general anaesthesia.

**Table 53: Approach to using a multimodal strategy for the prevention of HAP/VAP**

| | |
|---|---|
| System change – build it<br><br>*(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)* | • Ensure the necessary infrastructure and resources to enable measures to prevent HAP/VAP (e.g., appropriate ET material and type, adequate staffing, pre-prepared kits, PPE, hand hygiene supplies, sterile service department, etc.)<br>• Good infrastructure and available resources can streamline interventions for consistent care and make implementation easier and safer.<br>▪ Availability and access to guidelines, policies and procedures for staff |
| Training and education – teach it<br><br>*(to improve health worker knowledge)* | • Ensure that practical training and education methods are aligned with the recommendations for HAP/VAP prevention. Insufficient knowledge – particularly of HAP/VAP recommendations based on scientific evidence and why they are important – is a major obstacle to change.<br>▪ Use on site courses, simulations and videos, group discussions, bedside training, e-learning |
| Monitoring and feedback – check it<br><br>*(to assess the problem, drive appropriate change and document practice improvement)* | • Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) related to compliance with HAP/VAP placement and maintenance as a key process indicator. Evaluate regularly and report results in a timely manner.<br>• Monitor VAPs e.g., as part of a programme of surveillance for device-associated infections and provide feedback to wards and departments |
| Reminders and communication – sell it *(to promote the desired actions, at the right time, including campaigns)* | • Use visual protocols relating to insertion and make available at the point of care and where the procedure takes place. In addition, use posters to act as reminders for daily review, posters addressing hand hygiene, brochures, organizational charts, infographics as appropriate<br>• Communicate with patients and their visitors about the need for prevention methods. |
| Culture and change – live it<br><br>*(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)* | • Create an environment and perceptions that facilitate awareness of HAP/VAP prevention at all levels. Nurture a climate that understands and prioritizes safety and IPC issues. The culture of a hospital influences how teams work together and how valued people feel – and how they perform day to day. It can influence staff perceptions of their ability to make a change – e.g., to safer, evidence-based practices |

| | |
|---|---|
| | • Clinical leads should act as role models. Managers should ensure budgets are made available for necessary equipment and supplies including hand hygiene materials and support quality improvement. |

## 10.5 Surgical Site Injections

### Key practice points:

- Routinely check the surgical wound site for signs of infection
- Perform hand hygiene as per WHO Moments 2 (before clean/aseptic procedure) & 3 (after body fluid exposure risk) when performing surgical wound care (see chapter 3.1)
- Maintain an aseptic or non-touch technique when providing any wound care (see chapter 3)
- Perform prompt sample collection if a wound infection is suspected
- Apply post-operative wound dressings (after initial surgical wound dressing removal) only when wounds are exuding and suspected of infection.

### 10.5.1 Why do we need to manage surgical wounds?

- Wound infections are caused by bacteria that get in through incisions made during surgery.
- They threaten the lives of millions of patients each year and contribute to the spread of antibiotic resistance.
- Over 50% of surgical site infections can be resistant to antibiotics.
- In low- and middle-income countries, 11% of patients who undergo surgery are infected in the process.
- In Africa, up to 20% of women who have a caesarean section contract a wound infection, compromising their own health and their ability to care for their babies.

### When to manage surgical wounds

A number of evidence-based recommendations exist to ensure surgical wounds do not become infected. Specifically, within health care settings, infection can be introduced during the operation or post-operatively. For the steps to take within the OR refer to chapter 10.

Surgical wounds should be evaluated and then managed appropriately if upon inspection wounds are leaking discharge or other complications of infection occur, e.g., redness, heat, pain, swelling. There is no evidence-based timing for removal of surgical wound dressings, however, a wound should be checked after about 48 hours.

#### How to manage surgical wounds

Avoid touching of the post-operative wound site, including by the patient.

Surgical wounds should heal by primary intention and not require post-operative action besides observation but may not always heal normally due to many underlying and surgical procedure risk factors.

### 10.5.2 Considerations for surgical wound management in facilities with limited resources:

1. Also see hand hygiene section and PPE section.
2. For initial surgical wound coverage, advanced dressings should not be preferred over standard dressings (dry absorbent dressings) on primarily closed surgical wounds for the purpose of reducing surgical site infection. Therefore, the issue of cost and availability of such dressings has been addressed by the evidence.

### Additional considerations

Hand hygiene can be performed using alcohol-based hand rub, except for Moment 3 – after body fluid exposure risk, when hand washing is preferred.

Educate patients, and families, of signs and symptoms of wound infection, especially for monitoring post discharge.

Individual sterile wound dressing packs containing all of the sterile items required to dress a wound are preferable. Otherwise, all clean/sterile items should be gathered before starting the aseptic procedure, e.g., cleaning solution, gauze swabs, forceps.

International evidence supports the implementation of a combination of multiple interventions designed to address the enablers and barriers of surgical site infection prevention. WHO describe this as a multimodal improvement strategy. The five parts of the multimodal strategy translate recommendations into practice and is accompanied by a wide range of practical tools to support implementation.

***Table 54: Improving surgical wound management through a multimodal strategy***

| | |
|---|---|
| System change – build it<br><br>*(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)* | • Establish a careful local decision-making process to ensure purchase of necessary sterile items for surgical wound management including not to purchase advanced dressings. This may require presentation of data on cost-effectiveness and proposals for investing resources in other preventive measures to avoid SSI.<br>• Make available functional hand hygiene facilities. |
| Training and education – teach it<br><br>*(to improve health worker knowledge)* | • Put in place/improve a reliable mechanism for producing/ using updated training resources and information for all relevant staff on surgical wound management (use the WHO video on caring for a postoperative wound).<br>• Identify the expertise required to conduct training. |
| Monitoring and feedback – check it<br><br>*(to assess the problem, drive appropriate change and document practice improvement)* | • Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) regarding availability of standard dressings, sterile packs, wound management practices, SSI rates. |
| Reminders and communication – sell it *(to promote the desired actions, at the right time, including campaigns)* | • In collaboration with staff, develop/adapt/ implement reminders and agree upon their most relevant placement, to encourage appropriate postoperative wound management practices, for example, posters, flyers or stickers, including on the use of standard dressings. |

| | |
|---|---|
| Culture and change – live it<br><br>*(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)* | • Identify champions to promote the correct post-operative wound management within the surgical team. |

# Chapter 11: Healthcare Worker Protection and Safety

Key practice points:

- Put in place mitigations to minimise and in many cases remove risks to health care workers from a range of infectious agents during their day-to-day work.
- Chief mitigations include adherence to standard and transmission-based precautions (chapter 7), including timely and effective hand hygiene (chapter 3.1) and the appropriate use of PPE (chapter 3.2).
- Promptly notify when exposure to an infectious agent has occurred and take action to minimise harm.
- Provide post exposure prophylaxis programmes to protect health workers from harmful blood borne pathogens – ensure administration in a timely manner.
- Manage exclusion of health workers with or exposed to certain infectious agents to further protect patients and fellow health workers.
- Focus on a combination of a supportive infrastructure, the use of reminders (e.g., posters), training and education (consistent with guideline content), monitoring and evaluation (using a valid and reliable approach) and a safety culture, to make it more likely that health worker protection will happen.

## 11.1 Why IPC is important for health worker protection and safety?

- The WHO–ILO Global Framework for National Occupational Health Programmes for Health Workers, outlines that Ministries of Health need to consult and work together with other relevant Ministries on the development of the National Occupational Health Programme for Health Workers such as the Ministry of Labour, Social Security, and/or other organization(s) responsible for the protection and promotion of health worker health and safety in the private as well as public sector.
- Although healthcare workers (HCWs) are essential to the health of the world's population, they are often put in physical jeopardy. Globally, HCWs are exposed each day to a variety of health and safety hazards, including:
- Biological, (e.g., pathogens such as Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus, (HCV), Ebola, Mycobacterium Tuberculosis (MTB), SARS viruses and Neisseria Meningitis)
- Sharp's injuries.
- Ergonomic, (e.g., heavy lifting).
- Physical, (e.g., slips, trips and falls).
- Psychosocial, (e.g., violence and stress).
- Chemical, (e.g., chlorine, glutaraldehyde, ethylene oxide).
- Radiological and nuclear.
- Occupational exposure to potentially infectious materials may occur through an injury with a sharp object that has been used on a patient or through the contamination of mucous surfaces and broken skin with patient's blood or secretions.
- Protection of health care workers can be supported through an effective IPC programme, development and implementation of IPC guidelines and close working between IPC and Occupational Health teams. IPC is one aspect of occupational health.
- Blood borne viruses (HIV, HBV, HCV) present a special concern. Occupational exposure to HIV presents a low but measurable risk of infection to HCWs globally. It is estimated that through occupational exposure, 2.6% of HCWs are exposed to HCV, 5.9% to HBV

and 0.5% to HIV annually. The risk of conversion to HIV infection following a percutaneous injury has been estimated to be 0.3% and that following a mucosal exposure to be 0.09%. The risk of transmitting HBV and HCV is higher than the risk of transmitting HIV in most cases of exposure, especially in the health-care setting.

- HBV infection is a well-recognized occupational risk for HCWs and can be transmitted via exposure to body fluids. In addition to percutaneous injury, contact of mucous membranes or non-intact skin with blood, fluids containing blood, tissue or other potentially infectious bodily fluids pose an infectious risk. HBV is highly infectious, can be transmitted in the absence of visible blood, and may remain infectious on environmental surfaces for up to 7 days. It is well established that the sero-conversion after needle stick or sharp injuries contaminated with an infected source is 10–30% for HBV.
- Blood from persons with HBV infection contains the highest HBV titres of all body fluids and is the most important vehicle of transmission in the health-care setting. The following body fluids also are considered potentially infectious: cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, and amniotic fluid. Studies have documented HBV in saliva and tears. These body fluids have generally not represented an occupational risk for HBV infection unless they contain blood. Although, semen and vaginal secretions have been implicated in the sexual transmission of HBV, they have not been implicated in occupational transmission from patients to HCWs. The presence of hepatitis B surface antigen (HBsAg), usually an indicator of active HBV infection, also is found in other body fluids (e.g., breast milk, bile, faeces, nasopharyngeal washings, and sweat). Most body fluids are not efficient vehicles of transmission (unless they contain blood) because they contain low quantities of infectious HBV. Sputum, urine, and vomitus are not considered potentially infectious unless they contain blood.
- A safe working environment contributes to health care worker well-being and retention, increased productivity and economic best outcomes.
- Risks and hazards are fluid and need monitoring and adjustments made to the appropriate safety plans and processes.

**How and when to ensure health worker protection**

- **Responsibility of the health care facility -** employers have a responsibility to ensure a healthy and safe working environment for all employees. This includes:

~ Making relevant SOPs available to staff, based on evidence-based guidelines
~ Providing staff with appropriate orientation, training and supervision on safety procedures
~ Assessing and managing identified risks (e.g., investigate accidents and illnesses)
~ Documenting and reporting staff injury or illness.
~ Having a process for worker feedback on safety issues.
~ Demonstrably supporting IPC best practices for HCW safety.
~ Implementing vaccination of HCWs (see table 58: vaccination of HCWs)
~ Implementing PEP including counselling and follow up.

- This section focuses on health worker protection in the context of infectious or biological hazards. Occupational exposure to such hazards is usually avoidable if certain IPC-related measures are implemented.

- WHO guidance highlights the importance of guidelines on Health care worker protection and safety within health care facilities and that such guidance should address: aspects of improving working conditions, detection of occupational diseases, health surveillance of workers, pre-employment screening and vaccinations and in addition the importance of

routine communications between IPC and Occupational Health Programmes (where they exist).

- See also chapter 3, Standard Precautions and especially management of sharps injuries and, transmission-based precautions
- The key measures to protect health workers and keep them safe are highlighted in box 1.

**Box 1. key measures to protect health workers**

- Adherence with standard and transmission-based precautions (see chapters 3 and 4)
- Adherence with timely and effective hand hygiene (see chapter 3.1)
- Applying restrictions on HCWs who have potentially been exposed to an infectious disease (see table Work restrictions for healthcare workers exposed to or infected with infectious diseases).
- Implementing a post exposure prophylaxis (PEP) programme for exposure to HIV, HBV and HCV - where specific exposure has occurred, local PEP should be implemented (see box 2).
- Implementing a schedule of vaccinations (see table 58: Immunization of HCWs)

    - Local Public Health and/or Ministry of Health policies for HCW activity restrictions who have or may have been exposed to an infectious disease should be followed. In the absence of Local or National Guidelines a summary of suggested activity restrictions
    - *Note: no post exposure prophylaxis is available for filovirus infection, although an experimental vaccine for Ebola HF was administered on a compassionate use basis to a laboratory worker after a needle-stick injury with no apparent detrimental effect. Efficacy could not be assessed though interfering RNAs might show promise for prophylaxis.*

**Responsibility of healthcare workers –** health care managers have a duty of care to HCWs; however, health workers also have a responsibility to protect themselves and to not endanger others. Health care workers:

- Should follow safe work practices at all times, including being familiar with relevant SOPs.
- Should adhere to Standard Precautions and Transmission-Based Precautions
- Know the potential health and safety hazards of the job and protective measures by participating in appropriate occupational health and safety training programs.
- Use PPE (chapter 3.2) 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 and adhere to the exclusion policy.
- Participate in accident and injury investigations.
- Know what to do in an emergency.
- Participate in health and safety committees (when available) can be an important way to improve conditions on the job such as:
- Provide a forum for employees and management to work together to solve health and safety problems.
- Help prevent injury and illness on the job i.e., conduct regular walk-a-round inspections to identify potential health and safety hazards.

- Increase awareness of health and safety issues among employees, supervisors, and managers i.e., analyse injury data, accident reports and report trends.
- Develop strategies to make the work environment safe and healthy.

**Pre-placement health evaluations: screening and immunization**

- 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 acquire or transmit infectious diseases such as:
    - Chickenpox (varicella).
    - Measles (rubeola).
    - History of exposure to or treatment for tuberculosis (TB).
    - History of hepatitis.
    - Dermatologic conditions.
    - Chronic draining infections or open wounds.
    - Conditions with immunodeficiency such as HIV.
- Susceptible workers, including pregnant women, should not care for patients with chickenpox, herpes zoster (shingles), Rubella, or Measles (rubeola). Re-assignment of a pregnant employee is indicated if a patient has parvovirus B19 or receiving Ribavir in aerosol
- Physical examinations may be useful to detect conditions that may increase the likelihood of transmitting disease to patients, or unusual susceptibility to infection, and to serve as a baseline for determining whether any future problems are work-related.
- Physical examination may also include baseline vital signs, hearing and visual screening.

**Vaccination**

- 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 Infection Prevention and Control 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 followings:
    - 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 (flu).
    - Chickenpox (varicella).
    - TDP (Tetanus, Diphtheria, Pertussis).
    - Meningococcal Meningitis.

**Table 55: Vaccination of HCWs**

| 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. |
| Flu (Influenza) | Get 1 dose of influenza vaccine annually. |
| Varicella (Chickenpox) | 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 immunized 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 T dap as soon as possible if you have not received T dap 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 T dap during each pregnancy. |
| Meningococcal | Those who are routinely exposed to isolates of *N. meningitides* should get one dose. |
| Healthcare workers include physicians, nurses, emergency medical personnel, dental professionals and students, medical and nursing students, laboratory technicians, pharmacists, hospital volunteers, and administrative staff. | |

**Health counselling**

- Access to health counselling to all HCWs about illnesses they may acquire from or transmit to patients is especially important for all HCWs, but particularly for women of childbearing age and persons with special clinical conditions including immunosuppression.
- All personnel should know about infection risks related to type of employment.
- All supervisors should be responsible for informing HCWs of any special precautions (including hazardous chemicals) pertinent to their areas of work

**Job-related illnesses and management of exposures and injuries**

- Major functions of the HCW employee health service include arranging for prompt diagnosis, management of job-related injuries/ illnesses, providing prophylaxis for certain preventable diseases to which personnel may be exposed and maintaining confidential health records. A job-related illness is one that develops as a direct consequence of work undertaken at the place of employment although it might only present outside the workplace environment.
- In the event of a job-related injury the injured party should follow facility guidelines when obtaining first aid (as needed), notifying the supervisor immediately. The incident should be documented at the time along with measures taken to mitigate risk. Follow up with occupational health regarding the incident should be as soon as feasible and definitely within 72 hours If susceptible personnel contract a serious infection that is potentially transmissible or are

exposed to an illness that leads to a period during which infection may be spread, the hospital's responsibility to pre- vent the spread of infection to patients and other personnel may sometimes require that these persons be restricted from direct patient contact.

- All healthcare facilities should institute engineering and work practice controls whenever possible to eliminate or minimize employees' exposure to blood, body fluids, and other potentially infectious materials. Most exposures are preventable.

Managing Sharps injuries

- See chapter 3, Standard Precautions and specifically Prevention of sharps injuries.

## 11.2 Post Exposure Prophylaxis

See table 56 for a summary of PEP in relation to HIV, Hep B and Hep C.

**Table 56: Summary of PEP**

| | |
|---|---|
| General points | • Health care workers should have immediate access to PEP, 24 hours a day, 7 days a week to be freely dispensed by any hospital (private or public), regardless of the location or type of work they do.<br>• If PEP is being considered, the exposed person must be risk assessed and counselled.<br>• Following counselling and advice, the exposed worker may, in the absence of any contraindication decide to start PEP as outlined below. |
| What is PEP? | • PEP is generally understood to mean the medical response given to prevent the transmission of a blood borne virus following a potential exposure.<br>~ Hepatitis B: As per local guidelines, discuss with the local expert who will assess the immune status for HBV infection and will take appropriate action. Based on the assessment, Hepatitis B vaccine +/- Hepatitis B immunoglobulin can be given<br>~ Hepatitis C virus: Currently no vaccine is effective in the prevention of HCV transmission. However, treatment of acute hepatitis C infection is known to be highly effective. Please refer to the local expert for assessment, testing and treatment as per the local guidelines.<br>~ HIV: Urgent action is required. HIV PEP consists of a 28-day course of anti-retroviral. If indicated, the PEP should be started as soon as possible, ideally within one hour of exposure or within 72 hours' post-exposure. The HCF should keep starter packs usually in the pharmacy and this consists of a 3 to 5-day starter pack of anti-retroviral therapy. If PEP is started, first aid, risk assessment, counselling, review of the test result and monitoring of treatment is essential by local infectious disease personnel. Appropriate support and follow up is important. |
| Goals of PEP | • Maximal and durable suppression of replication of HIV, HBV and HCV;<br>• Preservation of immune function;<br>• Reduction of HIV, HBV and HCV related morbidity and mortality; and improvement of quality of life |
| The source & exposed persons | • The exposed person is the person who has been potentially at risk of acquiring the infection through exposure to blood or body fluids in his or her occupational or in another non-occupational situation (Idem).<br>• The source person is the person who is (either identified or not identified as) the possible source of contamination through potentially infectious blood or body fluids. If the sero-status of the source person is unknown, he or she may be asked to provide informed consent to HIV, HBV, HCV testing. The source person may be a patient if a health care worker is exposed |

| | |
|---|---|
| Main types of exposure considered for PEP | • Needle-stick injury or injury with a sharp object used on a patient.<br>• Mucosal exposure of the mouth or eyes by splashing fluids.<br>• Human bite.<br>• Broken skin exposed to a small volume of blood or secretions. |
| Components of the PEP programme | • A hospital's occupational post-exposure management program should encourage prompt reporting, assessment, evaluation, counselling, and provision of prophylactic medication and follow-up.<br>• A PEP Programme should provide educational programs for HCWs that emphasize the importance of implementing standard precautions (SP). It should also instruct HCWs how to proceed in the event of an occupational exposure potentially involving a blood-borne pathogens (BBP).<br>• The comprehensive package of PEP services offered depends on the setting and context in which the exposure occurs. A code of practice, protocols and standard operating procedures for PEP services need to be formulated as part of the process of developing policy.<br>~ Wash hands and other skin surfaces that become contaminated with blood or other potentially infectious materials immediately and thoroughly with soap and clean running water.<br>~ Thoroughly wash (flush) with water mucous membranes that become contaminated.<br>~ Prohibit HCWs with open wounds or weeping skin rashes from all direct patientcare, potentially hazardous laboratory procedures, and handling patient-care equipment until recovery.<br>~ Cuts or abrasions should be protected with a waterproof dressing and gloves prior to performing any procedure that involves contact with blood and other potential body fluids.<br>~ Record and monitor exposures to blood and body fluids.<br>~ Monitor infectious material.<br>~ Adequately staff healthcare facilities.<br>~ Provide information and training.<br>~ Maintain surveillance of work practices. |
| Key implementation points | • Effective implementation requires thorough assessment of exposed individual and source (where possible) and the transmission risk for infection of exposure, clinical and laboratory follow-up and the provision of information, education and support.<br>• For HIV - it has been shown that administration of ARVs within 72 hours of exposure reduces the likelihood of HIV infection being transmitted in persons who have been accidentally exposed to HIV through needle-stick inoculation or through contamination of mucous membranes by secretions.<br>• The ARVs needs to be continued for one month. The following guidelines should be followed in the event of accidental occupational exposure to material (i.e., blood, secretions, and excretions) that may contain HIV. |

**Eligibility for HIV PEP**

Assess the following to evaluate 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.
- See table 56 for a summary of clinical management of PEP for HIV exposure.

**Table 57: Degree of risk of HIV-infection after occupational exposure**

| | Low Risk | Medium Risk | High Risk |
|---|---|---|---|
| **Type of exposure** | Intact skin | Mucous membrane/non-intact skin | Percutaneous injury |
| **Source** | HIV negative (possibly in window period i.e., a period of time *after* a person is infected during which they won't test positive. This is called the "HIV window period" | HIV status unknown: Clinical well/ unwell | HIV positive with advanced disease, or confirmed drug resistance (consider treatment history) |
| **Material** | Saliva, tears, sweat, faeces, urine, sputum, vomitus | Semen, vaginal secretions, pleural, pericardial, peritoneal | Blood and body fluids: cerebral spinal fluid (CSF); viral cultures in labs, and amniotic fluid |

**Post-exposure prophylaxis 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.

**Counselling the HCW for PEP**

- At the time that the HCW first presents after exposure, counselling should be provided about their risk, the need for PEP, and its specific aspects, and the need for HIV testing to rule out the possibility that they might already be infected with HIV. Counselling should be provided before seeking informed consent for post-exposure prophylaxis. **note: informed consent for PEP services need not be in writing**
- The counselling should include information about, duration and course of medication (28 days), importance of adherence to the regimen, the possibility of side effects or toxicity, possible resistance to antiretroviral (ARV) medication, and the risk of transmission.
- The counsellors should assess the HCW's understanding of the dosing instructions.
- Risk-reduction counselling should be reinforced in later visits with appropriate follow-up support services to maximize adherence to the PEP regimen and to manage any side effects.
- Counselling to reduce risk is also necessary to prevent the transmission of HIV.
- Exposed persons should be counselled as follows:

- ~ Use condoms or other protective preventive measures with sexual partners until an HIV test after confirmatory test to the exposure event is negative.
- ~ Discontinue breastfeeding (if applicable).
- ~ Do not donate blood.

- People already living with HIV should be referred to an appropriate clinic for treatment of their infection, and if they had started PEP, the medication will be discontinued if their initial HIV test is positive, because this medication does not work for people living with HIV and could increase the risk of drug resistance among people already infected.
- PEP is critical.
- Whereas most medication that are prescribed for PEP are safe during pregnancy, women should be informed of the possible risk of transmitting HIV to the baby during pregnancy, especially at the initial stage of infection. Women who are breast-feeding should be told that although taking PEP is not harmful, if a woman gets infected by HIV while breastfeeding, the risk of transmitting HIV through breastfeeding is higher at the early stage of infection.
- Appropriate counselling should include a discussion of safe alternatives to breastfeeding if they are acceptable, feasible, affordable, safe, and sustainable. Exclusive breastfeeding is strongly recommended for babies less than six months of age whenever alternatives are not possible.
- Discussing the risk of HIV transmission associated with consensual sex after a person has been occupationally exposed could be difficult given the sensitive nature of the issue, but this dialogue is essential. HCWs need to be aware that some of the exposed people might not welcome the prospect of having to talk to sexual partners about the need to use a condom, and this can create barriers to follow-up and PEP adherence.
- Offering exposed individuals assistance in talking to their sexual partners about using condoms might be appropriate. People who have been exposed to HIV require emotional support in the period following the exposure.

**PEP Side effects**

- The most commonly reported side effects are nausea and fatigue. Side effects can be reduced, for example, by taking prescription medication (such as antiemetic for nausea) and by taking medicines with food. It is important for the person to anticipate and understand the side effects to avoid confusing them with symptoms of HIV seroconversion.

**Duration of PEP**

- The recommended duration of PEP for HIV infection is 28 days.
- The first dose should always be offered as soon as possible after exposure and the full PEP should be taken, unless there are specific reasons to stop.
- Starter packs with an incremental, full 28 days of dosing can be used.

**Laboratory evaluation: Baseline HIV testing**

- Baseline testing for HIV antibodies should be done to establish serologic status of the HCW at the time of exposure. This allows identification of HCWs who are already living with HIV, thereby avoiding the use of PEP for such people. Rapid HIV testing is the preferred option for testing both the exposed and source person. It also helps prevent giving PEP to an exposed person unnecessarily, that is, when the source person tests negative for HIV infection or is unlikely to be in the window period.

- If delays in testing of HIV are common, first dose of PEP should be provided based on the risk evaluation and the likelihood that the source person is HIV positive. Further evaluation should

be made as soon as possible after the test results are known. A positive rapid test should be confirmed with a second, different rapid test

- If rapid testing is not available, offer pre-test counselling. People who have a positive rapid test result should be referred to a comprehensive care clinic for management and further follow up. Follow-Up HIV Testing should be performed at 6 and 12 weeks and six months post-exposure, regardless of the use of PEP.

**Laboratory testing should be offered on an individual basis:**

- Test haemoglobin level when AZT is used for PEP. AZT should be avoided if anaemia is confirmed.
- Test for other blood-borne diseases such as HBV and hepatitis C virus (HCV), depending on the nature of the risk and the local prevalence.

**Record-Keeping**

- PEP services need to be documented at several levels. A national registry should be maintained to document the extent and outcomes of PEP use. Data are also needed to evaluate PEP services and identify trends, to make comparisons across services and over time, to guide future service planning and resource allocation, to support operational studies, and to demonstrate accountability to donors. This can often be facilitated by using a set of programme indicators. At the local level, incident reports are critical for reviewing when and how exposure occurs and for identifying safety concerns and possible preventive measures.
- The quality of data will be compromised if reporting requirements are excessively time-consuming, complicated, or too difficult. Thus, record-keeping systems should be kept as simple as possible. Data should be collected and analysed based on existing collection mechanisms whenever possible. The data collected as part of the record-keeping system also need to be reviewed and reported. The results of any data analysis should be shared with service providers and stakeholders. Maintaining the confidentiality of client data is of paramount importance. Written records of risk assessments, HIV tests, and PEP prescriptions should be subject to the same rigorous confidentiality controls as any other medical records. Secure systems for storing data and controls on access to medical records should be developed.

**Table 58: Summary of clinical management of PEP for HIV exposure**

| Item | Recommended Action And notes |
|---|---|
| Eligibility | Exposure was within 72 hours.<br>Exposed person is not known to be infected with HIV.<br>Significant exposure occurred.<br>Source patient tested negative for HIV but is still in the window period |
| Informed consent for PEP | Inform HCW about risks and benefits Consent may be given verbally |
| Medicine | First line of ARV medicine to be dispensed by a qualified person |
| Time to initiation | The initial dose of ARV medicines should be given as soon as possible but no later than 72 hours after exposure |

| | |
|---|---|
| Duration of therapy | Medicine should be taken for 28 days |
| HIV testing with informed consent and pre and post counselling according to protocols | Conduct baseline HIV testing in exposed person<br>Follow up HIV testing at 6 weeks, 12 weeks and 6 months after exposure.<br>Conduct rapid HIV test on the source patient if feasible and informed consent is obtained. Use Standard Operating Procedures |
| Additional laboratory evaluations | Pregnancy test if deemed necessary |
| Counselling | Stress the need for adherence and discuss side effects of medications, risk reduction, trauma or mental health problems, social support and safety |
| Referral | Make referrals as appropriate |
| Record keeping | Maintain accurate confidential records |
| Clinical follow-up | Assess and manage side effects, Assess and support adherence |

**Clinical follow-up**

- Follow-up and clinical monitoring to determine adherence and to identify and manage side effects should be provided. All available methods of communication should be considered.

**Follow-up counselling**

- In addition to the counselling outlined above, appropriate psychosocial support and further treatment assistance should be offered to all people who have received PEP, as available and when required. Exposed individuals should be made aware of the support services available and how to access them until the entire process including all testing is completed. This could be achieved by using a wider range of communication methods or by partnering with other local services to provide support during extended hours.

## 11.4 Hepatitis B

- HBV infection is a well-recognized occupational risk for HCWs and can be transmitted via exposure to bodily fluids. In addition to percutaneous injury, contact of mucous membranes or non-intact skin with blood, fluids containing blood, tissue or other potentially infectious bodily fluids pose an infectious risk.
- HBV is highly infectious, can be transmitted in the absence of visible blood, and may remain infectious on environmental surfaces for up to 7 days. It is well established that the sero-conversion after needle stick or sharp injuries contaminated with an infected source is 10–30% for HBV.
- Blood from persons with HBV infection contains the highest HBV titres of all body fluids and is the most important vehicle of transmission in the healthcare setting. The following body fluids also are considered potentially infectious: cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, and amniotic fluid. Although studies have documented HBV in saliva and tears, these body fluids have generally not represented an occupational risk for HBV infection unless they contain blood. Semen and vaginal secretions have been implicated in the sexual transmission of HBV, but they have not been implicated in occupational transmission from patients to HCWs. The presence of hepatitis B surface antigen (HBsAg), usually an indicator of active HBV infection, also is found in other body fluids (e.g., breast milk, bile, faces,

nasopharyngeal washings, and sweat). However, most body fluids are not efficient vehicles of transmission (unless they contain blood) because they contain low quantities of infectious HBV. Sputum, urine, and vomitus are not considered potentially infectious unless they contain blood.

- All HCWs whose work, training, and volunteer-related activities involve reasonably anticipated risk for exposure to blood or body fluids should be vaccinated with a complete >3 dose hepatitis B vaccine series. Antibodies for hepatitis B surface antigen (Anti-HBs) testing should be performed 1–2 months after administration of the last dose of the vaccine series when possible.
  - ~ If anti-HBs is at least 10 IU/L (positive), the vaccinee is immune. No further serologic testing or vaccination is recommended.
  - ~ If anti-HBs is less than 10 IU/L (negative), the vaccinee is not protected from hepatitis B virus (HBV) infection and should receive 3 additional doses of H BV vaccine on the routine schedule, followed by anti-HBs testing 1–2 months later.
  - ~ A vaccinee whose anti-HBs remains less than 10 IU/L after 6 doses is considered a “non-responder”.
  - ~ HCWs who are non-responders should be considered susceptible to HBV and should be counselled regarding precautions to prevent HBV infection and the need to obtain HBIG prophylaxis for any known or probable parenteral exposure to hepatitis B surface antigen (HBsAg)-positive blood or blood with unknown HBsAg status.

**Managing exposure to HBV (table 58):**

- The suggested steps for managing a body fluid exposure are as follows:
  - ~ Treat the exposure site appropriately.
  - ~ Assess the risk of HBV exposure and determine the immune status of the patient (history of jaundice, hepatitis, or previous vaccination with hepatitis B vaccine).
  - ~ If possible, collect a specimen from the HCW and from the patient for HBsAg testing.
  - ~ Give the first dose of HBV vaccine, which should be repeated at one and six months. If hepatitis B immunoglobulin (HBIG) is available, give 5 ml intramuscularly for passive immunization as soon as possible, but within seven days of exposure.

**Table 59: Post-exposure management of healthcare personnel after occupational percutaneous and mucosal exposure to blood and body fluids, by healthcare personnel – Hepatitis B vaccination and response status**

| Healthcare Worker Status | Post Exposure Testing | | Post Exposure Prophylaxis | | Post-vaccination serologic testing† |
|---|---|---|---|---|---|
| | Source patient (HBsAg) | HCP testing (anti-HBs) | HBIG* | Vaccination | |
| Documented responder after complete series (≥3 Doses | **No action needed** | | | | |
| Documented non- responder after 6 doses | Positive/ unknown | _____** | HBIG x2 separate by 1 month | ___ | No |
| | negative | **No action needed** | | | |
| Response unknown after 3 doses | Positive/ unknown | <10IU/L ** | HBIG x1 | Initiate revaccination | Yes |
| | Negative | <10IU/L | None | | |
| | Any result | ≥10IU/L | No action needed | | |
| Unvaccinated/incompletely vaccinated or vaccine refusers | Positive/ unknown | _____** | HBIG x1 | Complete vaccination | Yes |
| | Negative | _____ | None | Complete vaccination | Yes |

**Abbreviations:**

- HCW = health-care Worker; HBsAg = hepatitis B surface antigen; anti-HBs = antibody to hepatitis B surface antigen; HBIG = hepatitis B immune globulin.

- * HBIG should be administered intramuscularly as soon as possible after exposure when indicated. The effectiveness of HBIG when administered >7 days after percutaneous, mucosal, or nonintact skin exposures is unknown. HBIG dosage is 0.06mL/kg.
- † Should be performed 1–2 months after the last dose of the Hep B vaccine series (and 4–6 months after administration of HBIG to avoid detection of passively administered anti-HBs) using a quantitative method that allows detection of the protective concentration of anti-HBs (≥10 IU/L).
- A responder is defined as a person with anti-HBs ≥10 IU/L after ≥3 doses of Hep B vaccine.
- A non-responder is defined as a person with anti-HBs <10 IU/L after ≥6 doses of Hep B vaccine.
- ** HCW who have anti-HBs <10 IU/L, or who are unvaccinated or incompletely vaccinated, and sustain an exposure to a source patient who is HBsAg-positive or has unknown HBsAg status, should undergo baseline testing for HBV infection as soon as possible after exposure, and follow-up testing approximately 6 months later. Initial baseline tests consist of total anti-HBc; testing at approximately 6 months consists of HBsAg and total anti-HBc

**Exposure to HCV**

- There is no post-exposure vaccine or drug prophylaxis for HCV (immunoglobulin is ineffective). Prevention of exposure is the only effective strategy for preventing HCV. The following steps should be considered for follow-up of HCWs who become exposed to HCV-positive blood or other body fluids.
- Management Of employee after HCV exposure

At time of exposure:

~ Determine the type of exposure and assess the associated risk.
~ Wash wounds with soap and water; flush mucous membranes with water.
~ No post-exposure prophylaxis (immunoglobulin or antiviral medications) is recommended
~ Counsel the exposed person regarding hepatitis C transmission risk
~ Test source and exposed individual for hepatitis C virus antibody and liver enzymes for exposed individual.
~ If source is not available or refuses testing, treat exposed person as if source has active hepatitis C infection.
~ If source is hepatitis C virus antibody positive, or is antibody negative and is immuno-compromised, test source for qualitative HCV RNA.
~ If source is negative for hepatitis C antibody (and HCV RNA, if indicated), no further testing is necessary and no further action beyond initial HCV testing, is necessary for the exposed person
~ If source is positive for hepatitis C antibody and HCV RNA, and exposed person is negative, follow up of exposed person should be done.

**Follow up of exposed HCW to HCV positive source:**

- Perform baseline testing for anti-HCV and ALT activity; and Perform follow-up testing at 3 and 6 months for anti- HCV antibodies and ALT activity – if earlier diagnosis of HCV infection is desired, testing for HCV RNA (viral load) may be performed at 4 and 12weeks.

**PEP and exposures to Lassa fever**

- The antiviral drug Ribavirin seems to be an effective treatment for Lassa fever if given early on in the course of clinical illness.
- There is no evidence to support the role of Ribavirin as post-exposure prophylactic treatment for Lassa fever.
- There is currently no vaccine that protects against Lassa fever.
- Further information on Lassa Fever here:

https://www.who.int/news-room/fact-sheets/detail/lassa-fever

## 11.5 Mycobacteria tuberculosis (MTB)

- Refer to chapter 7 TBPs: airborne precautions.
- Mycobacteria tuberculosis (MTB) is a known problem in South Sudan and therefore a TB programme is essential in all health-care settings as part of a robust approach to IPC.
- The TB program should be 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).
- HCWs, including nurses, doctors, clinical officers, nursing and medical students, housekeeping staff, and others are vulnerable to TB exposure, infection, and disease. HCWs 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.
- In addition to performing work that involves diagnosis and treatment of TB, other risk factors for HCWs include the following:
  - ~ 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.

**Recommendations for TB Screening procedures for Settings (or HCWs) classified as medium Risk.**

- All HCWs should receive baseline TB screening upon hire, using chest x-ray, two-step tuberculin skin test (TST) or a single Bio Medical 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.

  ~ Instead of participating in serial testing, HCWs should receive a symptom screen annually.

- ~ This screen should be accompanied by educating the HCW about symptoms of TB disease and instructing the HCW to report any such symptoms immediately to the occupational health unit.

**TB Screening procedures for Settings (or HCWs) classified as potential ongoing transmission.**

- Testing for infection with TB might need to be performed every 8–10 weeks until lapses in infection control have been corrected, and no additional evidence of ongoing transmission is apparent.
- The classification of potential ongoing transmission should be used as a temporary classification only. It warrants immediate investigation and corrective steps. After a determination that ongoing transmission has ceased, the setting should be reclassified as medium risk. Maintaining the classification of medium risk for at least 1 year is recommended.

**HCWs with active TB**

- HCWs with TB disease should be allowed to return to work when they:
  - ~ Have had two 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.

## 11.6 SARS coronavirus (SARS CoV-2, SARS-CoV, or SARS)

- It is important to note that according to current WHO evidence, SARS-CoV-2, the virus that causes COVID-19, is primarily transmitted between people through respiratory droplets and close contact routes therefore Standard Precautions and transmission-based precautions should be employed.
- Within health care facilities, including long term care facilities, WHO recommends droplet and contact precautions when caring for COVID-19 patients and airborne precautions when and where aerosol generating procedures are performed. WHO also recommends standard or transmission-based precautions for other patients using an approach guided by risk assessment.
- HCWs are at high risk of being exposed to the infection, however IPC precautions will protect workers.
- In areas with COVID-19 community transmission, WHO advises that health workers and caregivers working in clinical areas should continuously wear a medical mask during all routine activities throughout the entire shift.
- In settings where aerosol generating procedures are performed, they should wear an N95, FFP2 or FFP3 respirator.

- WHO guidance also emphasizes the importance of administrative and engineering controls in health care settings, as well as rational and appropriate use of all PPE and training for staff on these recommendations

- Administrative measures related to health workers include:
  - ~ provision of adequate training for health workers;
  - ~ ensuring an adequate patient-to-staff ratio;
  - ~ establishing an active syndromic surveillance of health workers at the facility entrance when they arrive at work
  - ~ ensuring that health workers and the public understand the importance of seeking medical care promptly;
  - ~ monitoring health workers' compliance with standard precautions and providing mechanisms for improvement as needed.

**Management of HCWs exposed to COVID-19 virus**

- The management of HCWs exposed to COVID-19 varies according to their risk categorization. To determine the risk, the form "Risk assessment and management of exposure of health care workers in the context of COVID-19" https://apps.who.int/iris/bitstream/handle/10665/331496/WHO-2019-nCov-HCW_risk_assessment-2020.2-eng.pdf?sequence=1&isAllowed=y should be completed and based on responses to the questions the exposure will be classed as high or low risk.

**Recommendations for HCWs at high risk for infection:**

- Stop all health care interactions with patients for a period of 14 days after the last day of exposure to a confirmed COVID-19 patient;
- Be tested for COVID-19;
- Quarantine for 14 days in a designated setting.

**Health care facilities should:**

- Provide psychosocial support to HCW during quarantine, or throughout the duration of illness if HCW is confirmed to have COVID-19;
- Provide compensation for the period of quarantine and for the duration of illness (if not on a monthly salary) or contract extension for duration of quarantine/illness;
- Provide review of IPC training for the health care facility staff, including HCWs at high risk for infection after 14-day quarantine period.

**Recommendations for health workers at low risk for COVID-19:**

- Self-monitor temperature and respiratory symptoms daily for 14 days after the last day of exposure to a COVID-19 patient. HCWs should call the health care facility if they develop any symptoms suggestive of COVID-19;
- Reinforce contact and droplet precautions when caring for all patients with acute respiratory illness and standard precautions for all patients;
- Reinforce airborne precautions for aerosol-generating procedures on all suspected and confirmed COVID-19 patients;
- Reinforce the rational, correct, and consistent use of personal protective equipment;
- Apply WHO's "My 5 Moments for Hand Hygiene" before touching a patient, before any clean or aseptic procedure, after exposure to body fluid, after touching a patient, and after touching a patient's surroundings;

- Practice respiratory etiquette at all times.

SARS may be initially missed due to the non-specific nature of presenting symptoms, the possibility of absence of fever on initial measurements atypical presentations, co-morbidities masking SARS and the recognized difficulties of clinically diagnosing an atypical pneumonia.

### 11.7 Meningococcal meningitis

- Employers should provide adequate infection-control training to staff members, (e.g., use of appropriate PPE- mask when caring for suspected patients), PEP to exposed workers, and report notifiable diseases promptly to the local public health department.
- Symptoms of meningococcal disease are usually sudden onset of fever, headache, and stiff neck. It can start with symptoms similar to influenza (flu), and will often also cause nausea, vomiting, increased sensitivity to light, rash, and confusion.
- HCWs in close respiratory contact (e.g., suctioning, intubation) with such cases should receive PEP with ciprofloxacin or an effective alternative agent.

In addition to the IPC measures outlined in this section, the following controls should be implemented:

- Prohibit eating, drinking, smoking, applying cosmetics, and handling contact lenses in the work areas and on work surfaces 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 with blood borne pathogens
- 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

**Table 60: Approach to using a multimodal strategy to improve compliance with procedures and eliminate the risk of occupational exposures or HAIs**

| | |
|---|---|
| System change – build it<br>*(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)* | • Put in place/improve reliable access to the right equipment and supplies including PPE, hand hygiene products, 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 and an environment that is designed and planned to facilitate patient and health worker safety. This includes vaccination programs.<br>• 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). |

| | |
|---|---|
| | • Provide clearly written policies, guidelines, and procedures (SOPs) including protocols for surveillance and management of job-related illnesses and exposures to infectious diseases<br>▪ Invest in adequate staffing levels |
| Training and education – teach it<br>*(to improve health worker knowledge)* | • Provide a program of routine health and safety orientation, education and training and periodic retraining for all personnel (e.g., yearly).<br>• Training should 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 groups<br>▪ 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. |
| Monitoring and feedback – check it<br>*(to assess the problem, drive appropriate change and document practice improvement)* | • Pre-placement health evaluation of HCWs<br>• Record and monitor exposures to blood and body fluids<br>• Monitor and maintain surveillance of work practices |
| Reminders and communication – sell it *(to promote the desired actions, at the right time, including campaigns)* | • Prompt and remind all HCWs about safe practices by using accurate, well placed, accurate reminders which are checked and replaced regularly<br>• Establish and maintain a routine communications activity between IPC and Occupational Health Programmes (where they exist) |
| Culture and change – live it<br>*(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)* | • 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<br>• 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<br>• Maintain confidential employee health and injury records. |

### 11.8 Additional considerations

In addition to the IPC measures outlined in this section, the following controls should be implemented:

- Prohibit eating, drinking, smoking, applying cosmetics, and handling contact lenses in the work areas and on work surfaces 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 with blood borne pathogens

- 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

# Chapter 12: Education and Training in IPC

IPC education for healthcare workers is key in ensuring that patients and healthcare workers remain safe. By understanding the basics of transmission, all health workers can contribute towards reducing HAI by implementing simple yet effective IPC measures. This therefore means that robust IPC Programs in facilities have to include training of healthcare workers as a key component in the Facility IPC Program.

WHO classifies healthcare workers requiring training into three groups. 1) IPC staff; 2) health care professionals; 3) support (non-clinical) health workforce including administrators, sterile services, cleaners, and porters. A national IPC curriculum for these groups includes the link nurse programme.

IPC Training must be **conducted by IPC trained tutors, master of trainers and trainer of trainers with knowledge grounded in the most recently available evidence.**

There are different types of training that can be offered for IPC:

1. In-service training

In-service IPC training entails CMEs, on-site mentorship, coaching and support supervision on a regular basis and should follow identified training needs as evidenced by the monthly IPC Assessment data. In-service training is tailored to build the competence of Health-Care Workers in Infection Prevention and Control and ultimately reduce the risk of HAI Transmissions

2. Pre-Service training

**Capacity Building in IPC**

Building Capacity in IPC requires staff training which is a process of promoting the acquisition of knowledge, the development and improvement of specific skills, practices and the changing of attitudes towards IPC standards. The success of Infection Prevention and Control Programs, depends largely on healthcare workers knowledge on IPC best practices. IPC expertise will depend on the level of implementation of Core Component 3(IPC Training and Education) and engagement of academic institutions in running professional IPC Trainings, for example Post Graduate Diploma in IPC. Core Component 3 requires support at National Level for IPC Practitioners to achieve expert level of knowledge which is endorsed by academic institutions and focus on building career paths for IPC.

**IPC practitioners**

All IPC focal persons appointed or seconded to a position in accordance with the WHO Core Component 1(IPC Programs) should be trained in accordance with the national IPC curriculum based on national guidelines and international (WHO) evidence-based policies.

**IPC Practitioners national curriculum**

Newly appointed IPC practitioners should attend competency-based training courses within one year of taking up their post. They should be competent in evidence-based IPC practices. They should be able to provide mentorship to the health facility workforce towards preventing transmission of HAI pathogens, and implementation skills towards reducing AMR through surveillance and feedback, monitoring, and evaluating IPC systems through audit and feedback, while ensuring high quality service delivery

## 12.1 Who should be included in IPC Training programmes.

All HCWs should be included in IPC Training Programmes. Basic IPC should be incorporated into all health professions undergraduate training.

### Frequency of Training

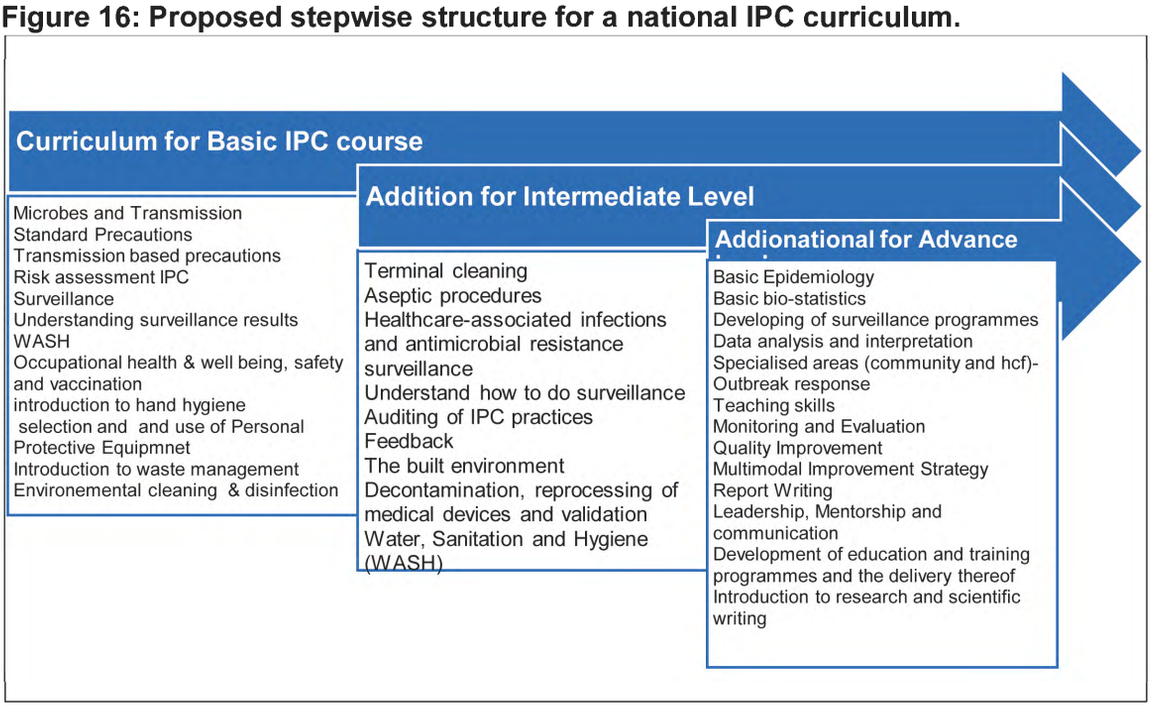
- As part of training for undergraduate students
- Upon appointment of new staff
- During on-boarding in a specific department
- Annually
- On the spot (as the need arises)
- On job mentorship.

It is important that periodic evaluations of the effectiveness of training and staff knowledge be evaluated.

### Curriculum

Training in IPC should progress from the essential (basics) to the specialized. IPC is a process which encompasses healthcare procedures but also requires skills such as management, communication & writing, feedback and conceptual skills to give expert input into the layout of health facilities design and various other aspects to reduce transmission. **Table 62** outlines the topics which should be covered in different curriculums starting with the basic and progressively becoming more complex, requiring in-depth knowledge at Postgraduate diploma in IPC (PDIC) level.

**Figure 16: Proposed stepwise structure for a national IPC curriculum.**



**Different Training Programmes**

Table **61** provides a recommendation of the level of IPC training that different categories of health workers should receive.

**Table 61: Recommended training for category of Health worker**

| Course | Category of health workers |
|---|---|
| **Basic IPC for all health workers** | Clinical practitioners including nurses and doctors, allied healthcare professional, support services and ancillary workers |
| **Intermediate** | Link nurses*<br>Healthcare Managers<br>IPC practitioners<br>*Link nurses are a valuable resource at ward level and should be trained to a higher level than the basic health worker so that they can provide the necessary support for the clinical teams. Link nurses can also be used to create a "pool" of possible IPC practitioners in future with further development and ensure continuity in IPC through successor planning. |
| **Advance IPC Training** | Newly appointed IPC practitioners should attend competency-based training courses within one year of taking up their post. They should be compe4r6tyty tent in evidence-based IPC practices. They should be able to provide mentorship to the health facility workforce towards preventing transmission of HAI pathogens, and implementation skills towards reducing AMR through surveillance and feedback, monitoring and evaluating IPC systems through audit and feedback, while ensuring high quality service delivery. |
| **Post Graduate Diploma (PDIC)** | IPC practitioners who have been in a post for approximately two years. The course builds upon the Fundamentals in IPC (FIPC) and prepares IPC practitioners in leadership roles, to take charge of IPC programmes in healthcare facilities at a higher level and grade within the IPC career path |
| **On-the job training/on-the job mentorship** | The IPC team should provide on the job training with a NO BLAME culture during clinical ward rounds or site visits, as part of the audit or assessment during the visits. This training could be related to any clinical or non-clinical matters requiring attention. |

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**Table 62: Suggestion for topics to be included at various levels of IPC training**

| Recommended topics for stepwise training in IPC | Basic IPC | Intermediate | FIPC | PDIC |
|---|---|---|---|---|
| Microbes and transmission | X | X | XX | XXX |
| Antimicrobial resistance | X | X | XX | XXX & AMS |
| Standard Precautions | X | X | XX | XXX |
| Hand Hygiene | X | X | XX & Audit | XXX & Audit |
| Personal protective equipment | X | X | XX | XXX |
| Environmental cleaning | X | X | XX | XXX |
| Safe patient care articles | X | X | XX | XXX |
| Interpreting HAI surveillance | X | X | XX | XXX |
| Patient environment, zone & surroundings | X | X | XX | XXX |
| Safe handling & disposal of sharps | X | X | XX | XXX |
| Healthcare waste management | X & Segregation | X | XX | XXX |
| Linen and laundry management | X | | XX | XXX |
| Transmission-based precautions | X | X | XX | XXX |
| Cough etiquette | X | X | XX | XXX |
| Occupational health and vaccination | X | X | XX | XXX |
| Terminal cleaning post discharge | X | X | XX | XXX |
| HAI & AMR surveillance | | X | XX | XXX |
| Aseptic procedures & bundles | | | XX | XXX |
| Epidemiology & basic statistics | | | XX | XXX |
| IPC & the built environment & ventilation | | | XX | XXX |
| Health facility layout and workflow | | | XX | XXX |
| WASH | | | XX | XXX |
| Specialized areas | | | | |
| OT, Burns, NNU, isolation, Maternity, A & E, Ambulance | | | XX | XXX |
| Outbreak response - community & health facility | | X | XX | XXX |

| | | | | |
|---|---|---|---|---|
| Teaching & training skills | | X | XX | XXX |
| Writing reports | | | XX | XXX |
| Monitoring & evaluation | | | XX | XXX |
| Feedback and reports | | | XX | XXX |
| Leadership/ mentorship | | | XX | XXX |
| Data collection | | X | XX | XXX |
| IPC with a QI focus | | | | XXX |
| Operational research methodology | | | | XXX |
| Designing healthcare facilities | | | | XXX |
| Procurement | | | | XXX |
| Costing of an IPC service | | | | XXX |
| Ethics | | | | XXX |
| Communication with public | | | | XXX |
| Active membership of committees | | | | XXX |
| Advisory role to MOH & managers | | | | XXX |

Key X- Basic , XX Intermediate and XXX High level

The WHO further recommends that the following areas and Core Competencies should be included in a curriculum for IPC Professionals/Practitioners **(Table 62)**

**Table 63: Core Competencies for IPC Professionals**

| Areas | Competencies |
|---|---|
| **Leadership and IPC program management** | IPC program management and leadership |
| | Built environment in health care facilities |
| **Microbiology and surveillance** | Basic microbiology |
| | Antimicrobial resistance prevention |
| | Health care-associated infection surveillance |
| **IPC in clinical practice** | Standard precautions |
| | Transmission-based precautions |
| | Decontamination and reprocessing of medical devices and equipment |
| | Catheter-associated bloodstream infection prevention |
| | Catheter-associated urinary tract infection prevention |

| | |
|---|---|
| | Surgical site infection prevention |
| | Prevention of health care-associated infections |
| | Health care-associated outbreak prevention and management |
| **Education** | Infection prevention and control education and training |
| **Quality, patient safety and occupational health** | Quality and patient safety |
| | Occupational health |

# Chapter 13: Monitoring & Evaluation

Monitoring and evaluation (M&E) assist with programme implementation and also continuously motivate and support implementers. It provides a systematic method to document the progress and impact of IPC programmes in terms of defined indicators. There is little value in monitoring or auditing without timely feedback to managers and health workers at unit/ward level. Regular feedback promotes best practices and over time results in behaviour or system change towards improved quality of care and patient safety, with a goal to reduce HAI and AMR through a multimodal strategy (MMS) approach.

M&E further assist to engage stakeholders, creating partnerships and developing working groups and networks. As part of quality improvement, monitoring, audit and feedback are important tools for informing and convincing health workers and managers of an existing problem and providing expert input into potential solutions that can then be tested. This should take place in a blame free environment.

M&E should include an assessment of the extent to which standards are being met, goals accomplished, activities performed according to requirements, and identify aspects that may need improvement. Doing this helps to create a “monitoring and learning” culture to identify areas for improvement.

**When to do monitoring and evaluation**

Monitoring, audit and feedback is a continuous process. Monitoring activities should be considered from the development of an IPC programme and continue to become an important part of the implementation process. M&E should be done regularly and there should be an audit programme with clear objectives, goals and targets in each facility.

**Who should do the monitoring and evaluation?**

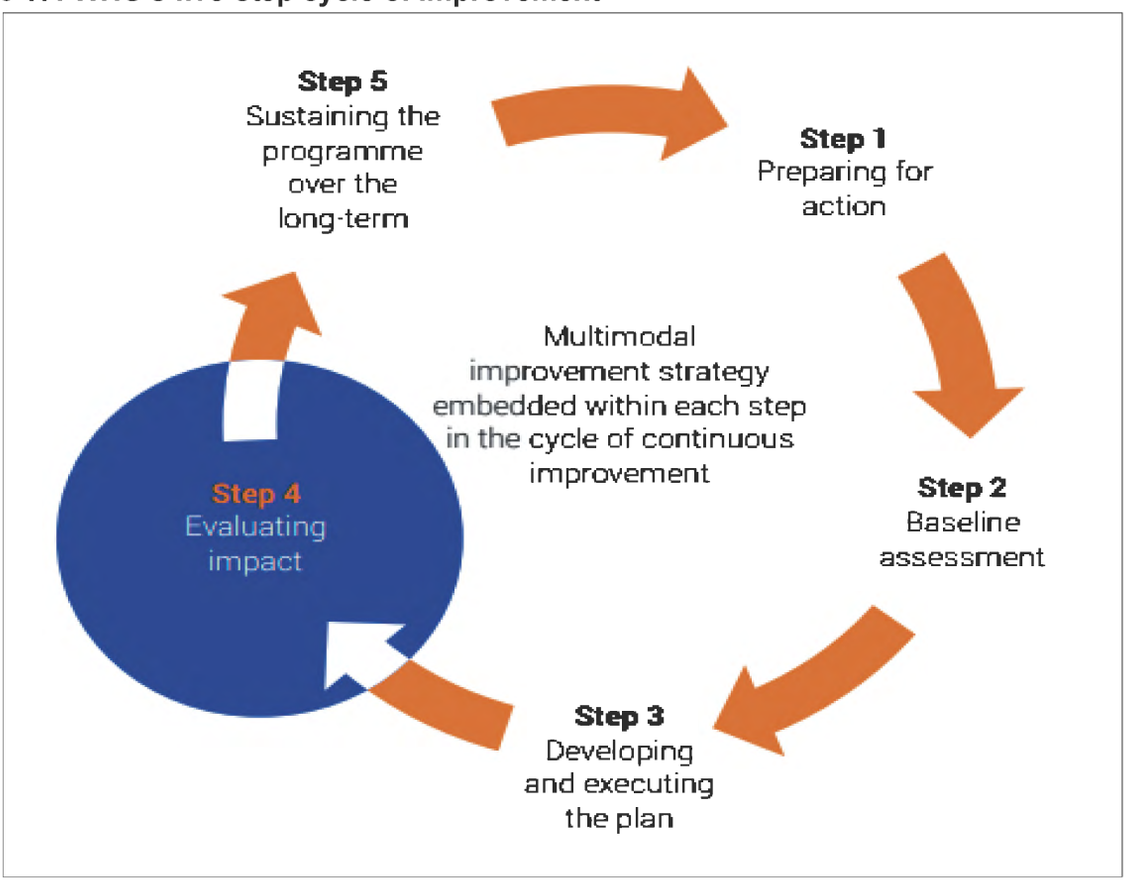
M&E are key activities of IPC practitioners and the IPC team. They should be supported by the IPC committee. Link nurses can assist with audits and evaluation of IPC practices.

**Implementing a monitoring, evaluation and feedback programme**

- There must be clear goals, targets and activities.
- Tools for data collection must be developed. Existing tools can be adapted to local needs and circumstances.
- Clearly defined processes and indicators over a wide range of activities such as:
  - Hand hygiene compliance
  - Consumption of ABHR
  - Intravascular catheter insertion and maintenance
  - Urinary catheter insertion and maintenance
  - Compliance to measures to prevent surgical site infections.
  - Compliance with transmission-based precautions
  - Environmental cleaning compliance
  - Compliance to IPC bundles
- Establish mechanisms for feedback to the IPC team, department leaders and managers and frontline health workers.
- Develop regular feedback reports that include analysis of data and trend reports.
- Use data, reports and engagement with stakeholders to develop training programmes and create a learning culture.
- Use data to develop quality improvement projects.

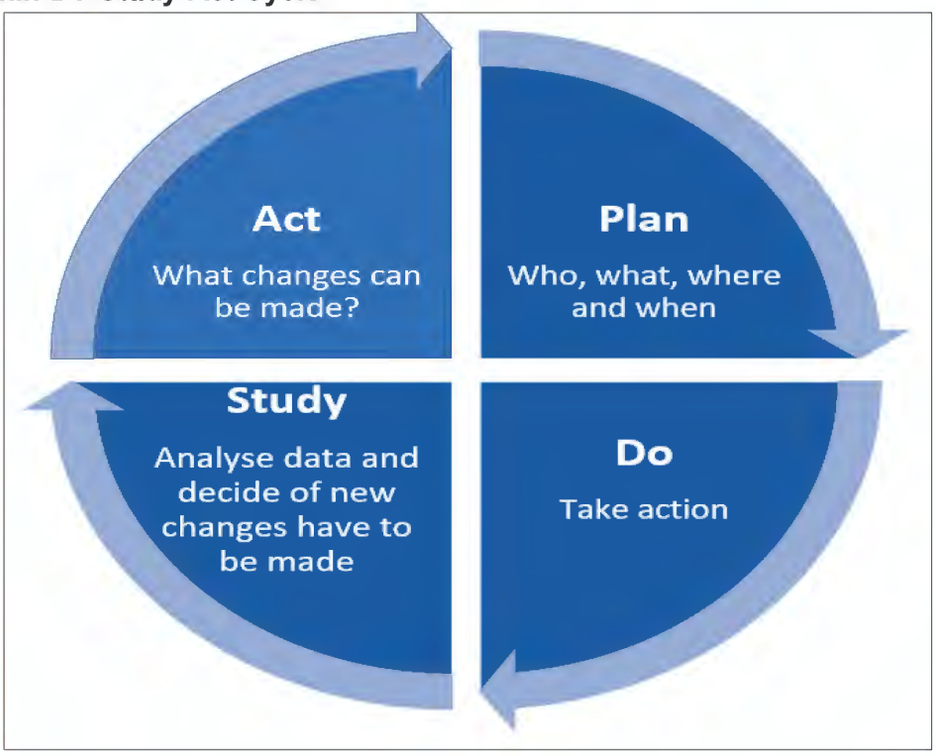
The WHO developed a five-step cycle of improvement to support implementation of interventions which is grounded in the principles of successful change and improvement in health care. Step four of the cycle is to evaluate the impact of the improvement, thus using the data collected to drive improvement and implement changes where required. See **Figure 17**

**Figure 17: WHO's five-step cycle of improvement**




Audit provides a method for assessing progress and identifying gaps which can be improved in a stepwise manner by testing changes using PDSA (Plan, Do, Study, Act) cycles (**Figure 18**. Time invested in monitoring, audit and timely feedback are driving forces towards improvement and changing behaviour.

**Figure 18: Plan-Do-Study-Act Cycle**




### Assessment Tools for IPC

Various tools are available for the assessment of IPC. These tools assist HCF to comply with regulations can be adapted to local needs. The recommended tools and frequency of use are detailed in **Table 63**.

**Table 64: Audit tools and frequency of use**

| Tools | Frequency of assessment |
|---|---|
| WHO Hand hygiene tool | Quarterly |
| WHO IPC Assessment Framework at facility level (IPCAF) 2023 - Minimum Requirement | Annually |
| WHO Hand Hygiene Self-Assessment Framework. 2010 | Annually |
| WHO Washfit Assessment Tool | Annually |
| South Sudan Quality Standards tool | Baseline and 6 monthly<br>National: Annually |

Regular audit and feedback of IPC processes and practices is essential to identify risks timely and to develop the necessary quality improvement projects.

### Examples of audits

- Availability of infrastructure to perform hand hygiene (e.g., availability of water, liquid soap, paper towels, alcohol based handrubs)
- Compliance to hand hygiene
- Environmental cleaning compliance

- Adherence to use of approved cleaning and disinfection materials
- Disinfection and sterilization of medical and surgical equipment
- Safe collection and disposal of waste
- Adherence to the correct procedures for the management of linen
- Kitchen and food hygiene
- Adherence to standard precautions (hand hygiene, PPE)
- Adherence to Transmission-based precautions
- Handling and dispensing of medication.
- Disposal of sharps and other healthcare risk waste
- IPC Bundles: (Prevention of SSI, CLABSI, CAUTI and VAP)

**Quality Improvement**

Results from M&E programmes should be used to develop Quality Improvement (QI) programmes. QI in IPC refers to a systematic approach to enhance the processes and outcomes related to preventing and controlling of infections within healthcare settings. It involves identifying areas for improvement (e.g., through monitoring programmes), implementing interventions, measuring the impact, and adjusting to achieve better IPC practices.

**Approach to Quality Improvement**

A quality improvement (QI) approach has the following advantages:

**Patient Safety**

Helps to identify and address any deficiencies in IPC process, reducing the risk of infections and adverse events.

**Compliance with Standards**

Helps to monitor and improve processes to meet regulatory requirements, accreditation and quality standards.

**Efficiency and Cost Savings**

Enable teams to optimize their workflows and streamline processes which will lead to increased efficiency. Eliminating waste and reducing errors in the healthcare setting, will lead to improved patient safety

**Monitoring and Evaluation**

Regular audit and monitoring of processes, identifying areas for improvement, and implementing changes, can improve operational efficiency and ensure that best practices are followed consistently.

**Staff Engagement and Empowerment:**

Involving staff in QI initiatives empowers them to contribute to the betterment of their department and creates ownership and accountability.

**Risk Mitigation:**

QI assist with risk identification and mitigate by implementing quality control measures, ensuring equipment maintenance, and enhancing staff training and competency assessments.

**Model for Improvement**

QI consists of systematic and continuous actions that lead to measurable improvement in health care services and the health status of targeted patient groups. The Institute of Healthcare Improvement (IHI) Model for Improvement **(Figure 18)** recommend the following approach:

**Three fundamental questions are asked which can be addressed in any order.**

- What are we trying to accomplish?
- How will we know that a change is an improvement?
- What changes can we make that will result in an improvement?

**The ''Plan-Do-Study-Act (PDSA) cycle"** that is used to test changes in real work settings. The PDSA cycle guides the test of a change to determine if the change is an improvement.

***Figure 19*: Model for Improvement**

It is important that problems and risks are identified and that the necessary interventions are implemented to mitigate the risks or solve the problem.

**Steps of Quality Improvement**

The following steps should be followed to implement a QI project after a problem has been identified:

- Forming the Team
- Setting an Aim
- Establishing Measures
- Selecting Changes
- Testing Changes
- Implementing Changes
- Spreading Changes

After successful implementation of a change or package of changes for a pilot population or an entire unit, the team can spread the changes to other parts of the organization or in other organizations.

It is important that the outcome of QI projects is shared with Management teams as well as the health workers in the units where the project was implemented, and that progress is shared continuously.

**Multimodal Improvement Strategy**

Following a multimodal improvement strategy (MMIS) will further assist with sustainable change. The WHO recommends that multiple approaches should be followed in combination to influence behaviour of health workers. Implementation of a multimodal strategies have to be linked with the aims and initiatives of QI programmes and accreditation bodies both at the national and facility levels.

By utilizing quality improvement methodologies, healthcare facilities can enhance patient safety, ensure compliance with standards, improve efficiency, empower staff, mitigate risks, and promote a culture of continuous improvement in sterilization practices.

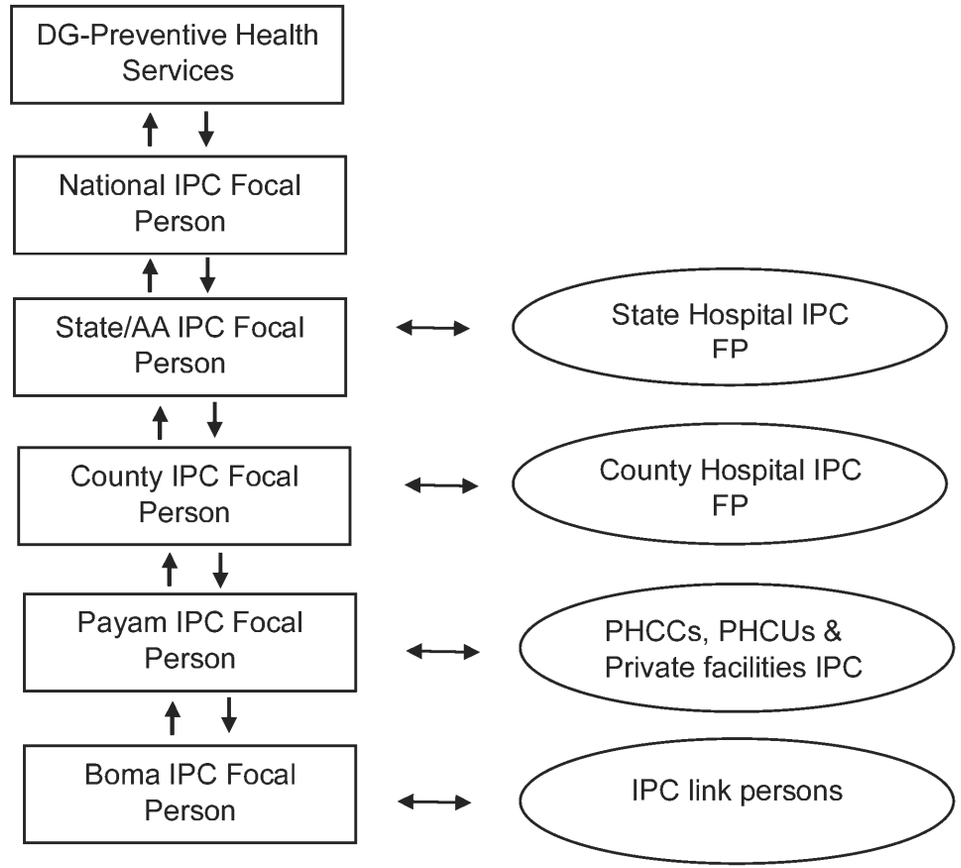
## References:


1. Allegranzi, B., et al. Burden of endemic healthcare-associated infection in developing countries: systematic review and meta-analysis. Lancet, 2011: 377:228-41. Available: https://pubmed.ncbi.nlm.nih.gov/21146207/
2. Lowe, L., et al. Challenges and opportunities for infection prevention and control in hospitals in conflict-affected settings: a qualitative study. Conflict and Health. 2021, 15 (1): 94. Challenges and opportunities for infection prevention and control in hospitals in conflict-affected settings: a qualitative study | Conflict and Health | Full Text (biomedcentral.com)
3. Abubakar, U., Amir, O., Rodriques-Bano, J., Healthcare-associated infections in Africa: a systematic review and meta-analysis of point prevalence studies. Journal of Pharmaceutical Policy and Practice. 2022. 15:99.
4. https://joppp.biomedcentral.com/articles/10.1186/s40545-022-00500-5
5. https://www.who.int/publications/i/item/9789240051164
6. WHO Global Strategy on infection prevention and control. 2023. Available: https://cdn.who.int/media/docs/default-source/gsipc/global-strategy-for-ipc-draft-version-2-20-5-23.pdf?sfvrsn=d690f61b_21&download=true
7. WHO. Minimum requirements for infection prevention and control programmes. 2019. https://www.who.int/publications/i/item/9789241516945
8. WHO. Multimodal Improvement Strategy. Available: https://www.who.int/publications/m/item/who-multimodal-improvement-strategy
9. Mehtar, S. 2010. Understanding Infection Prevention and Control. Juta & Company. Claremont. South Africa
10. World Health Organisation. 2019. Minimum Requirements for infection prevention and control programmes. Geneva: World Health Organisation. Available at: https://www.who.int/publications/i/item/9789241516945
11. Dramowski, A., Wood, D., Mehtar, S., Bettercare. Infection Prevention and Control. A guide for healthcare workers in low-resource settings. Available: https://bettercare.co.za/infection-prevention-and-control/index.html
12. World Health Organization [Internet]. Clean Care is Safer Care: Infection Prevention and Control. Available from: https://www.who.int/csr/resources/publications/EPR_AM2_E7.pdf
13. CDC Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings, 2007. http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf
14. Guidelines on Core Components of infection prevention and control at the national and acute healthcare facility level. WHO 2016. Available from https://www.who.int/infection-prevention/publications/core-components/en/
15. Haley RW, Culver DH, White JW, Morgan WM, Emori G, Munn VANP, et al. The efficacy of infection surveillance and control programs in preventing nosocomial infections in US hospitals trol committees in the 1960s, the Centers through stn international conference on In January 1974, CDC initiated the GENIC Project Study. 1985;20894.
16. Boyce JM, Pittet D. Guideline for Hand Hygiene in Health Care Settings. Infect Dis Clin Pract. 2002;11(5):306–11
17. Pittet D, Allegranzi B, Sax H, Dharan S, Pessoa-Silva CL, Donaldson L et al. Evidence-based model for hand transmission during patient care and the role of improved practices. Lancet Infect Dis. 2006;6(10):641–52.
18. Shen L, Wang X, An J, An J, Zhou N, Sun L, et al. Implementation of WHO multimodal strategy for improvement of hand hygiene: A quasi-experimental study in a Traditional Chinese Medicine hospital in Xi'an, China. Antimicrob Resist Infect Control. 2017;6(1):1–7

19. WHO.Technical reference Manual.2009. Available: https://apps.who.int/iris/bitstream/handle/10665/44196/9789241598606_eng.pdf?sequence=1&isAllowed=y
20. SA MoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic
21. National Institute for Health and Clinical Excellence. Infection prevention and control of healthcare-associated infections in primary and community care. 2012.
22. World Health Organization. WHO | Clean Care is Safer Care [Internet]. 2009. p. 6. Available from: http://www.who.int/gpsc/en/\nhttp://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf
23. WHO. Hand Hygiene Technical Reference Manual. 2009. https://apps.who.int/iris/bitstream/handle/10665/44196/9789241598606_eng.pdf?sequence=1&isAllowed=y
24. WHO. Glove use information leaflet. 2009. Available: https://cdn.who.int/media/docs/default-source/integrated-health-services-(his)/infection-prevention-and-control/hand-hygiene/tools/glove-use-information-leaflet.pdf?sfvrsn=13670aa_10
25. WHO. Infection Prevention and Control of Epidemic- and Pandemic-Prone Acute Respiratory Infections in Health Care. 2014. Available: https://www.ncbi.nlm.nih.gov/books/NBK214348/
26. WHO. Safer Injection Practices. 2017. Available: https://cdn.who.int/media/docs/default-source/integrated-health-services-(his)/infection-prevention-and-control/injection-safety/advocacy/is_healthcareproviders_leaflet.pdf?sfvrsn=bb7f4169_7&ua=1
27. WHO. Safe management of waste from health-care activities, 2nd edition. 2014. https://www.who.int/publications/i/item/9789241548564
28. WHO. Safe management of waste from health-care activities, 2nd edition. 2014. https://www.who.int/publications/i/item/9789241548564
29. WHO. Overview of technologies for the treatment of infectious and sharp waste from healthcare facilities. 2019. https://apps.who.int/iris/handle/10665/328146
30. Best Practices for Environmental Cleaning in Healthcare Facilities: for Resource-Limited Settings [Internet]. Atlanta: US Centers for Disease Control and Prevention and Cape Town: Infection Control Africa Network, 2019. Available from: http://www.icanetwork.co.za/icanguideline2019/
31. CDC and ICAN. Best Practices for Environmental Cleaning in Healthcare Facilities in Resource-Limited Settings. Atlanta, GA: US Department of Health and Human Services, CDC; Cape Town, South Africa: Infection Control Africa Network; 2019. https://www.cdc.gov/hai/pdfs/resource-limited/environmental-cleaning-RLS-H.pdf
32. CDC. Environmental Cleaning. Available: https://www.cdc.gov/hai/prevent/resource-limited/cleaning-procedures.html#:~:text=Proceed%20from%20cleaner%20to%20dirtier%20areas%20to%20avoid%20spreading%20dirt,patient%20zones)%20before%20patient%20toilets
33. Rohde, R., 2016. Colour coding to prevent hospital infections. https://infectioncontrol.tips/2016/02/12/colour-coding-to-prevent-hospital-infections/
34. Mehtar S, Andre N. H. Bulabula A NH, Haurace Nyandemoh H and Steve Jambawai S; Deliberate exposure to chlorine - the aftermath of Ebola in West Africa. Antimicrobial Resistance and Infection Control (2016) 5:45 DOI 10.1186/s13756-016-0144-1
35. Global Task Force on Cholera Control. Water, Sanitation and Hygiene and Infection Prevention and Control in Cholera Treatment Structures. 2019. Available: https://www.gtfcc.org/wp-content/uploads/2019/10/gtfcc-technical-note-on-water-sanitation-and-hygiene-and-infection-prevention-and-control-in-cholera-treatment-structures.pdf

36. World Health Organisation. 2016. Decontamination and reprocessing of medical devices for health-care facilities. Available; https://www.who.int/publications/i/item/9789241549851
37. WHO. Aide-memoire. Standard precautions for the prevention and control of infections. 2022. https://www.who.int/publications/i/item/WHO-UHL-HIS-IPC-2022.1
38. CDC Guideline for isolation precautions: Preventing transmission of infectious agents in healthcare settings, 2007. Appendix A. http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/Isolation2007_appendixA.pdf later version: http://www.cdc.gov/ hicpac/2007IP/2007ip_appendA.html
39. Core questions and indicators for monitoring WASH in health care facilities in the Sustainable Development Goals. Geneva: World Health Organization and the United Nations Children's Fund (UNICEF), 2018.
40. World Health Organisation. Healthcare-associated Infections Surveillance. Open WHO course. https://openwho.org/courses/IPC-HAI-EN
41. CDC. National Healthcare Safety Network. Patient Safety Component Manual. Available: https://www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf
42. CDC. Basics of Epidemiology. https://www.cdc.gov/csels/dsepd/ss1978/lesson6/section2.html
43. WHO. Caring for those who care. Guide for the development and implementation of occupational health and safety programmes for health workers.2022. Available: https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/publication/wcms_837585.pdf
44. WHO. Core Competencies for Infection Prevention and Control Professional. 2020. https://www.who.int/publications-detail-redirect/9789240011656
45. WHO Minimum requirements for IPC programmes. 2019. https://www.who.int/publications/i/item/9789241516945
46. WHO. Improving IPC at the Health Facility. Interim practical manual supporting implementation of the WHO guidelines on Core Components of IPC programmes. 2018. Available: https://apps.who.int/iris/bitstream/handle/10665/279788/WHO-HIS-SDS-2018.10-eng.pdf?sequence=1&isAllowed=y
47. WHO IPC Assessment Framework as facility level (IPCAF). 2018. Available: https://www.who.int/publications/i/item/WHO-HIS-SDS-2018.9
48. WHO Washfit A practical guide for improvement quality of care through water, sanitation and hygiene in healthcare facilities 2nd Edition.2022. Available: https://www.who.int/publications/i/item/9789240043237
49. Institute of Healthcare Improvement. Model for Improvement. Available https://www.ihi.org/resources/Pages/HowtoImprove/ScienceofImprovementHowtoImprove.aspx
50. Republic of South Sudan Ministry of Health: Guidelines for the Safe Management of Medical Waste, 2013
51. Republic of South Sudan Ministry of Health: Policy on Medical Waste Management, 2013

## Appendix 1: National IPC Structure Organogram and ToR of Committees



## 1(B) Terms of reference for various Committees

### Infection Control Committee Terms of Reference

Responsibilities of Infection Control Management

**MINISTRY OF HEALTH – Preventive Health Services Unit**

**Key person should be the head of the unit (Deputy Director)**

**Role: Develop Policies and Guidelines for Infection Control.**

- Review Policy and develop Standard Operating Procedures
- Ensure effective management and control arrangements at different operational levels in MOH.
- Review guidelines and resource needs assessment including training needs on a regular basis.
- Ensure annual update on current infection control practices during annual meetings.
- Review and analyse surveillance data annually and develop infection control indicators and standards.
- Develop a national risk management and prevention and control framework.
- Approve and support an appropriate research agenda.
- Risk assessment and management and quality assurance.
- Ensure availability of equipment and supplies at all levels.
- Advise and assist Regional Management in:
    - Developing systems for monitoring of compliance for infection control guidelines and practices
    - Developing systems for national surveillance, its implications and required interventions.
    - Developing outbreak response protocols.

**Role of the Infection Control Doctor**

The Infection Control Doctor is usually the consultant Microbiologist. In the absence of such person, the hospital management can assign the task to a doctor who specializes in infectious disease management or who is willing to take on the additional responsibility.

The doctor should have access to laboratory facilities and authority to arrange for laboratory test if required for infection control purposes.

Additional responsibilities include:

- Provision of leadership for the infection control committee.
- Establish and maintain close working relations with the Infection Control Nurse/ Focal person and Infection Control Link Nurses.
- Development of antibiotic regimens for infectious disease management with the support of the pharmacist.
- Guide and assist with infectious disease surveillance and monitoring.

**MINISTRY OF HEALTH – County/State Management Level**

Key person should be the Director General at the state Ministry of Health

- Monitor adherence to national and regional infection control guidelines and practices.
- Evaluate infection control resource needs, including training needs.
- Participate in annual review of infection control guidelines and practices.
- Compile and communicate annual reports to National Quality Assurance Unit.
- Appoint or allocate a focal person at State level to manage, coordinate and support activities at County level:

- Ensure surveillance and monitoring at County level.
- Review and analyse surveillance data and reports. Support annual training activities and meetings.
- Advice and support implementation of preventative and control measures. Ensure adequate updated outbreak response protocols.
- Risk assessment and management and quality assurance. Ensure availability of supplies at all levels.

**MINISTRY OF HEALTH – State/County Management Level**

**Key person should be the Senior Medical Officer in the State/County Hospital**
Provide specialist IPC support to the county management team and nurses in charge of County facilities in relation to:

- The prevention, surveillance, management and control of infection.
- The implementation of preventative and control measures.
- Identification and management of outbreaks.
- Annual and intermittent training of all heath care personnel.
- The development of communication links within health care facilities.
- Review facility surveillance reports and compile annual reports for State/ County Level.
- Monitor and support facilities for adherence to policies and guidelines and enforce steps for non-adherence.
- Evaluate and implement infection control resource needs, especially training needs.
- Conduct monthly and quarterly meetings and forums for infection control management.
- With Hospital infection control team Contribute to the annual review of infection control guidelines.
- Ensure availability of supplies at all levels.

**Functions of the Hospital Infection Control Team**
- Team authority to facilitate appropriate programme functions at all times.
- Ensure:
- Adequate resource allocation and supplies for effective infection prevention, management and control.
- Provision of appropriate technical support to the team on technical aspects related to infection control (maintenance, cleaning, catering, laboratory, laundry, CSSD, etc.). Annual and quarterly regular infection control training (induction, in-service and continuous education) programmes are conducted.
- Regular monitoring and evaluation of programme implementation and timely intervention for effective infection control.
- Participation in continuous and periodic review and update of policies and guidelines
- Conducting Regular CMEs on IPC for hospital staff
- Spearheading the non-monetary championship among different department

**Hospital Infection Control Committee Core Members**
- Medical Practitioner in Charge of Hospital
- Medical Practitioner / assigned for infection control Nursing Manager in Charge of Hospital
- Infection Control Nurse/ Nurse assigned to infection control Infection Control link Nurses from all clinical departments Laboratory Technician
- Pharmacist

- Chief Control Officer / Control Officer (cleaning, catering, maintenance) Health and Safety Manager (Occupational Health Officer) Environmental Health Officer
- Works department representative (maintenance)

Composing a team representative may be difficult as not all hospitals have the posts. Striving for the best possible representation would assist in meaningful discussions, decision-making and appropriate action.

**Functions of the Hospital Infection Control Committee**

- Identify the needs of the facility in relation to infection control. (e.g., waste management, food safety, sterilization etc).
- Prioritize needs and develop a strategic plan (3-5 years) and make recommendations for adequate funding to present to management.
- Analyse infection control risks and make recommendations to acquire new equipment, pharmaceuticals and products for effective infection control practices.
- Develop an annual infection control programme budget in relation to agreed upon priorities, resource needs and scheduled activities.
- Develop monitoring and evaluation tools and conduct regular monitoring and evaluation visits to review the infection control programme implementation.
- Participate in regular review of infection control guidelines and practices.
- Ensure regular review and adaptation of policies and guidelines to local priorities.
- Ensure regular training, surveillance and auditing for effective infection control practices.
- Ensure regular cleanliness surveys are conducted and regular hand washing campaigns
- Ensure the identification of structural needs for infection control as part of facility repair and maintenance.
- Ensure the development of a hospital outbreak response protocol.
- Conduct regular management meetings to review programme implementation. Scrutinize and approve infection control reports for submission to State, county and National level.

**Role of the Matron State/County Hospital)**

- Participate actively in committee meetings.
- Promote the development of improved nursing techniques.
- Ensure infection control training programmes are developed and implemented for all members of staff.
- Ensure supervision is conducted and periodically participate in monitoring and evaluation activities.

**Terms of Reference of Infection Control Nurse (ICN)/ Hospital IPC Focal Person**

- A nurse/clinician formally trained in Infection Control, able to provide specialist and appropriate guidance to health care workers in the hospital and county on infection control practices.
- Detailed responsibilities include:
- Training in infection control practices (formal and informal), at induction and on a continuous basis.
- Continuous education on infection control for implementers with assistance of link nurses.

- Auditing the environment for compliance to standard practices, using monitoring and evaluation tools. (Hand washing, safe waste disposal).
- Respond on issues of concern on daily and ad hoc basis. Routine screening of patients (surveillance) in high-risk areas.
- Risk management to prevent infection, protect staff and patients and detect outbreaks.
- Monitoring infectious disease management in isolation and surveillance laboratory testing.
- Collect process and analyse data to review and manage the programme. Report to the Infection Control Committee on a monthly basis.
- Conduct regular meetings with link nurse/ focal persons to identify issues of concern and support in addressing such issues effectively.
- Maintain infection control equipment inventory. Ensure compliance with local and national guidelines.
- Liaise with relevant County health structures and others where appropriate

**Role of the Infection Control Link Nurses/ Focal persons**

- Act as a resource person and liaison officer with the Infection Control Nurse. Have sufficient clinical experience and authority.
- Facilitate liaison between the infection control nurse and the unit (clinical area) on all aspects of care and clinical support services.
- Directly responsible to ICN on infection control issues (policies and guidelines). Act as a resource person for ward/unit staff on issue pertaining to infection control.
- Assist in the education of staff in the clinical area in the principles of infection control. Participate in the review of infection control policies and guidelines.
- Inform the IC Nurse/Focal Person of infectious cases in unit/ward and consult on appropriate arrangements.
- To conduct regular surveillance rounds and keep documentation. Provide daily supervision on infection control practices in relation to adherence.
- Provide information to assist in early detection on outbreaks of infection. Provide feedback to infection control nurse on issues of concern.
- Attend Infection Control meetings on a regular basis.

**Role of Hospital Pharmacist**

- Provide the Therapeutic and Infection Control Committees with summary reports on antimicrobial use.
- Obtain, store and distribute pharmaceutical preparations correctly and educate staff on the appropriate handling of such to prevent contamination and infection.
- Maintain records on antibiotic distributions to wards/units.
- Obtain information on disinfectants, antiseptics and other anti-infectious agents and advise committee on:
    - Active properties in relation to concentration, temperature and length of action.
    - Toxic properties including sensitization or irritation of skin and mucosa.
    - Substances incompatible with antibiotic use.
    - Physical conditions that may influence the potency of products.
    - Harmful effects on material.

**Role of the Laboratory Technician**

- Develop guidelines for appropriate specimen collection, handling and transportation.
- Ensuring laboratory practices meet appropriate standards and ensure safe laboratory practices to prevent contamination and infection.

- Perform specified testing.
- Participate in guideline and policy development.
- Attend infection control meetings regularly.
- Participate in monitoring and evaluation visits.

**Role of Cleaning Services**

- To implement regular and routine cleaning of all surfaces and maintain a high level of hygiene in the facility.
- Ensure that cleaning areas are classified according to their varying need for cleaning and implement the policy accordingly.
- Determining appropriate work systems to ensure cleaning, laundry and waste disposal are efficiently executed on a daily basis.
- Regularly inform maintenance team on building problems repair, cracks, and defects. Prevent and monitor for the presence of pests and report to the local Health Inspector.
- Provide training to new staff and regular updates on new techniques and procedures. Develop and execute extensive training on an annual basis to address the pertinent aspects of:
    - Hand washing,
    - Cleaning methods, correct use of diluting agents and equipment,
    - Waste disposal

**Role of Laundry Services**

- To implement the policies and guidelines for collection and transportation of linen.
- To protect clean linen from contamination during transportation.
- Ensure safety of laundry staff in prevention of exposure to sharps or contamination with potential pathogens.
- Ensure the appropriate disinfection of infectious laundry before the normal washing processes.
- Ensure that staff is supplied with protective clothing and wear it according to protocol.
- To maintain appropriate supplies for optimal functioning of laundry services.
- Ensure laundry services are implemented in accordance with guidelines.

**Role of Food Services Department**

The Management of the food service department should be:

- Knowledgeable in food safety, the storage and preparation of food and the safe use of equipment, and take the responsibility to:
    - Define criteria for purchase of food products and equipment to maintain a high level of safety.
    - Ensure food handling methods are free from contamination during storage, preparation and distribution of food.
    - Ensure a safe working environment for staff.
    - Issue written guidelines and instructions on staff responsibilities for hand washing, protective clothing, care of dish cloths, and daily disinfection duties.
    - Ensure special considerations are implemented in handling food and utensils for infected or isolated patients.
    - Ensure the correct handling of kitchen waste according to policy.
    - Establish a programme for training of staff in food preparation, cleanliness and food safety.

**Role of Maintenance**

- The management of Maintenance in close collaboration with the Administrative Officer of the hospital should play a coordinating function with all relevant departments and be responsible for:
- Regular inspection of buildings for plumbing, heating, ventilators ,cooling systems faults and problems and keep adequate records on inspection.
- Ensuring that faulty systems are replaced and repaired according to manufacturer's instructions.
- Conducting regular inspection of all surfaces, walls, floors and window frames and initiate timely repairs.
- Developing an incident reporting system with all the relevant units for timely response to critical aspects of care provision.
- The development of procedures for emergency repairs (e.g., broken down autoclave) Notify infection control of anticipated interruption of services such as plumbing or air conditioning.

**Role of Central Sterilization Services Department (CSSD)**

The unit serves all hospital areas with sterile supplies, including the operating theatre. The person managing the unit should have knowledge and experience of medical supplies and equipment. The unit should:

- Clean, decontaminate, test, prepare for use and store all sterile hospital equipment.
- Develop and monitor policies on sterilization methods, according to type of equipment.
- Ensure optimum sterilization conditions (temperature, humidity, duration and pressure)
- Ensure appropriate cleaning and decontamination of re-usable equipment, including wrapping procedures.

**The CSSD Manager should:**

- Oversee the use of different methods to monitor sterilization processes.
- Ensure regular technical maintenance of equipment according to standards and manufacturers requirements. Report any defective equipment timely.
- Maintain adequate records of each autoclave run and ensure long-term availability of records.
- Communicate to relevant departments on issues of concern. Attend the infection control meeting when required.
- Participate in monitoring and evaluation visits.

## Appendix 2: SOP on Cleaning and heat disinfection of liquid soap container

**Step 1:** Wash used containers with soap and lukewarm water in a designated sink ensuring all traces of soap has been removed.

**Step 2:** Fill a bowl with 250 to 500 ml of clean water and place it in a microwave. This will act as a heat sink to ensure the liquid soap containers do not overheat or melt during the microwaving process.

**Step 3:** Place the bowl with the liquid soap containers in the microwave and run for at least 3 minutes on the highest setting. Remove carefully when completed, **DO NOT TOUCH THE INSIDE OF CONTAINERS.**

**Step 4:** Inspect the liquid soap container to ensure integrity. Discard if damaged.

**Step 5:** Bottles must be thoroughly dried by inverting upside down on a drainer or using an air-dryer.

**Step 6:** Each liquid soap container should be labelled with a date when refilled.

## Appendix 3: HH Techniques

## Appendix 4: Surgical Hand Wash Technique

# Surgical hand preparation

# Save lives: clean your hands

- The handrubbing technique for surgical hand preparation must be performed on perfectly clean, dry hands.
- After the operation when removing gloves, hands must be rubbed with alcohol-based hand rub (ABHR), or washed with soap and water if necessary.
- Surgical procedures may follow each other using ABHR as a surgical hand preparation if the following handrubbing technique is followed:


Dispense ± 5mL (3 doses) of ABHR into palm of left hand.


Dip fingertips in ABHR to decontaminate under nails (5 seconds).






Smear ABHR over right forearm up to elbow until fully evaporated (10-15 seconds).



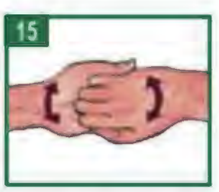

Repeat for other hand and arm.


Dispense another ± 5mL into clean hands.


Rub palms together.

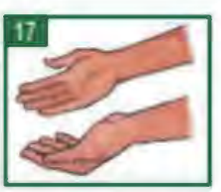

Place one hand over back of other, rub between fingers. Swap hands.


Rub fingers between each other.



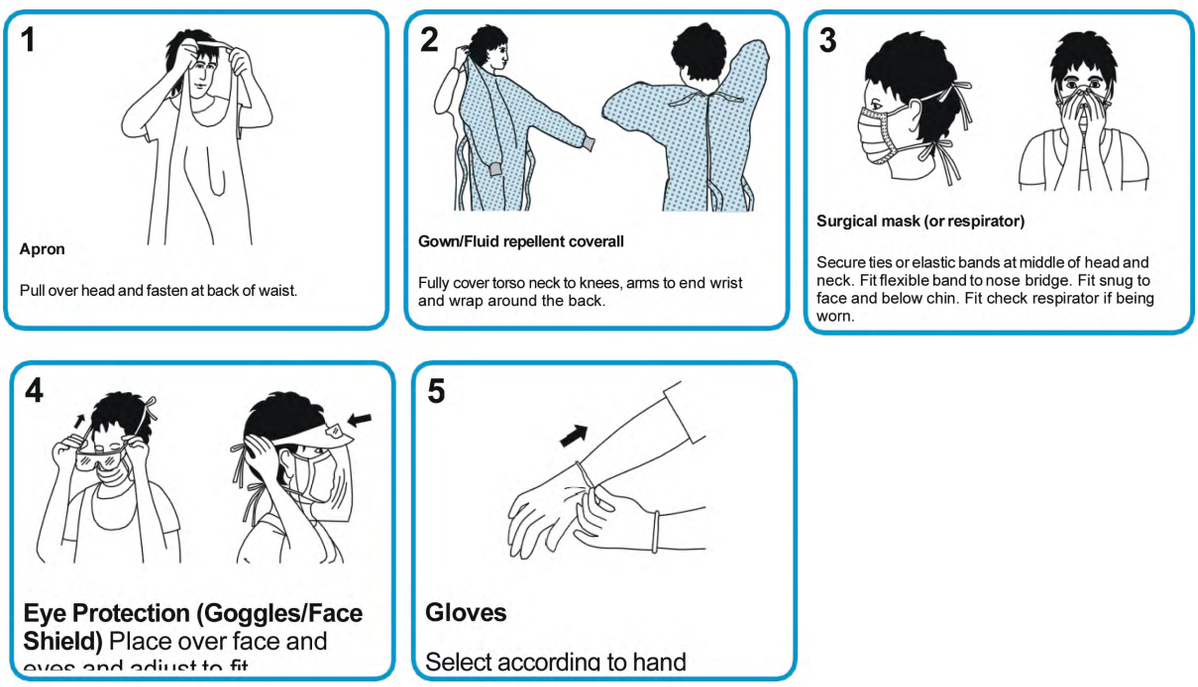

Grip fingers and rub together.


Rub each thumb with opposite palm. Swap hands.




The surgical hand rub is complete.

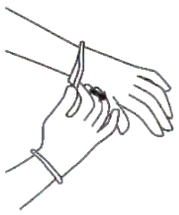
## Appendix 5: How to put on and remove basic PPE




**Perform hand hygiene before putting on PPE**

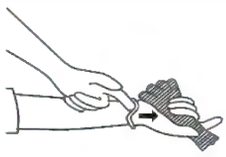
## Appendix 5 (b): How to remove basic PPE.

**6**



Outside of gloves are contaminated. Grasp the outside of the glove with the opposite gloved hand; peel off.

**7**



Hold the removed glove in the gloved hand. Slide the fingers of the ungloved hand under the remained glove at the wrist. Peel the second glove off over the first glove. Discard into an appropriate lined waste bin.

**8**

**Apron**

Apron front is contaminated. Unfasten or break ties.Pull apron away from neck and shoulders touching inside only. Fold and roll into a bundle. Discard into an appropriate lined waste bin.

**9**

**Gown/Fluid repellent coverall** Gown/Fluid repellent coverall front and sleeves are contaminated. Unfasten neck, then waist ties.

**10**

Remove using a peeling motion; pull gown/fluid repellent coverall from each shoulder towards the same hand.

**1**

Gown/fluid repellent coverall will turn inside out. Hold removed gown/fluid repellent coverall away from body, roll into a bundle and discard into an appropriate lined waste bin or linen receptacle.

**12**

**Eye Protection (Goggles/face shield)** Outside of goggles or face shield are contaminated. Handle only by the headband or the sides. Discard into a lined waste bin or place into a receptacle for reprocessing/ decontamination.

**13**

**Surgical Mask (or respirator)**

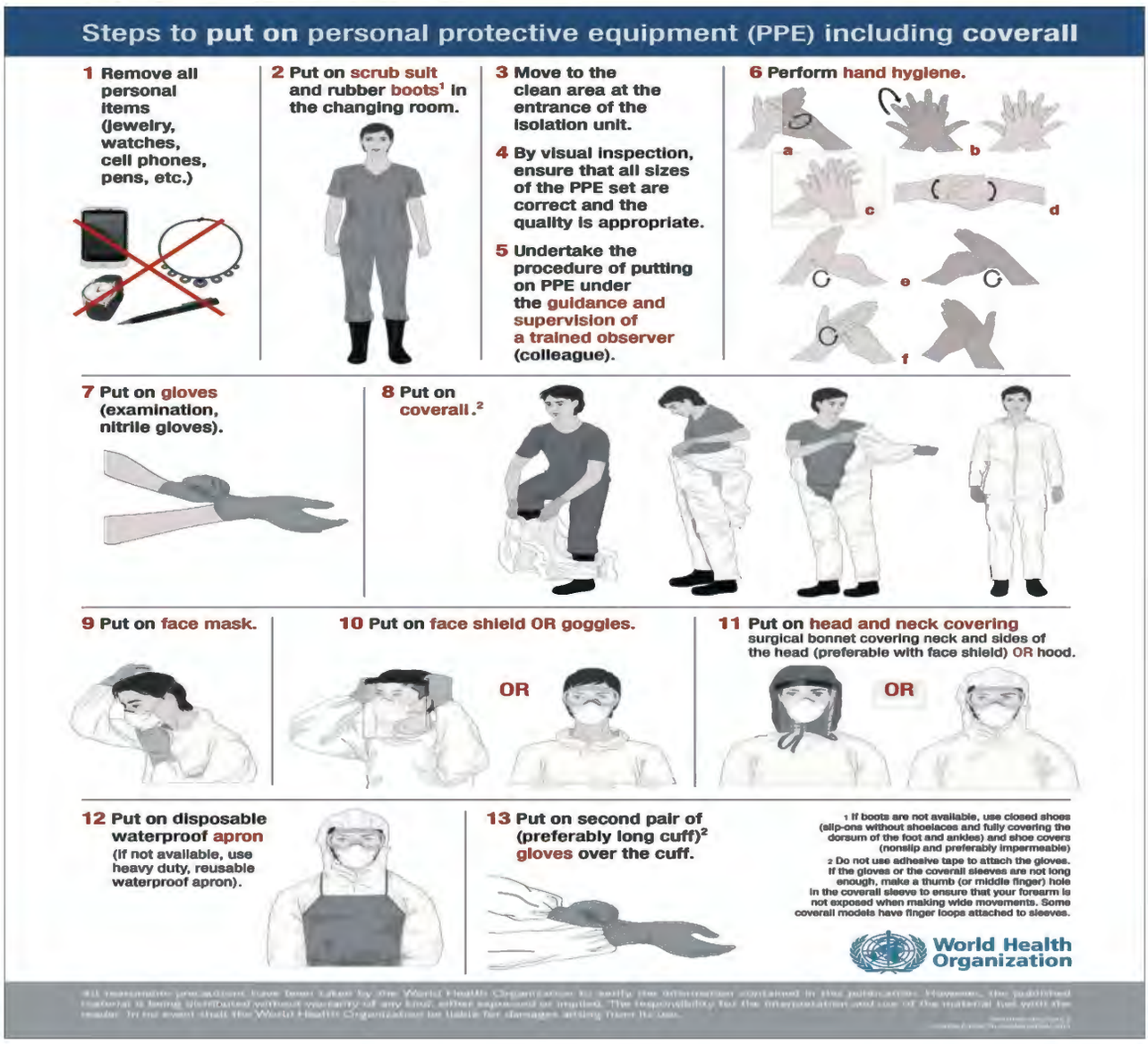
Front of mask/respirator is contaminated

- do not touch. Unfasten the ties - first the bottom, then the top. Pull away from the face without touching front of mask/respirator. Discard disposable items into an appropriate lined waste bin. For reusable respirator place in designated receptacle for processing/ decontamination.

**Perform hand hygiene immediately on removal**

**All PPE should be removed before leaving the area and disposed of as healthcare waste**

## Annex 6: How to don extended PPE



# Appendix 7: How to doff extended PPE

## Steps to take off personal protective equipment (PPE) including coverall

**1** Always remove PPE under the guidance and supervision of a trained observer (colleague). Ensure that infectious waste containers are available in the doffing area for safe disposal of PPE. Separate containers should be available for reusable items.

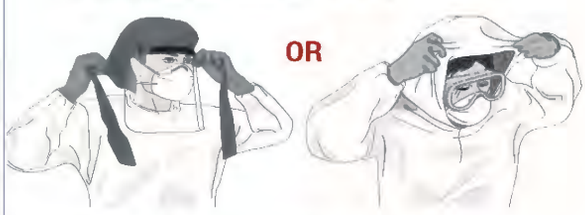
**2** Perform hand hygiene on gloved hands.[1]

**3** Remove apron leaning forward and taking care to avoid contaminating your hands.

When removing disposable apron, tear it off at the neck and roll it down without touching the front area. Then untie the back and roll the apron forward.

**4** Perform hand hygiene on gloved hands.

**5** Remove head and neck covering taking care to avoid contaminating your face by starting from the bottom of the hood in the back and rolling from back to front and from inside to outside, and dispose of it safely.



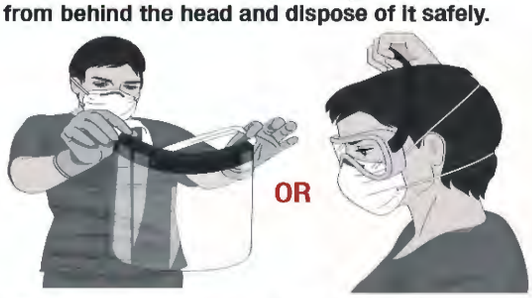

**6** Perform hand hygiene on gloved hands.

**7** Remove coverall and outer pair of gloves:

Ideally, in front of a mirror, tilt head back to reach zipper, unzip completely without touching any skin or scrubs, and start removing coverall from top to bottom. After freeing shoulders, remove the outer gloves[2] while pulling the arms out of the sleeves. With inner gloves roll the coverall, from the waist down and from the inside of the coverall, down to the top of the boots. Use one boot to pull off coverall from other boot and vice versa, then step away from the coverall and dispose of it safely.

**8** Perform hand hygiene on gloved hands.

**9** Remove eye protection by pulling the string from behind the head and dispose of it safely.




**10** Perform hand hygiene on gloved hands.

**11** Remove the mask from behind the head by first untying the bottom string above the head and leaving it hanging in front; and then the top string next from behind head and dispose of it safely.

**12** Perform hand hygiene on gloved hands.

**13** Remove rubber boots without touching them (or overshoes if wearing shoes). If the same boots are to be used outside of the high-risk zone, keep them on but clean and decontaminate appropriately before leaving the doffing area.[3]

**14** Perform hand hygiene on gloved hands.

**15** Remove gloves carefully with appropriate technique and dispose of them safely.

**16** Perform hand hygiene.

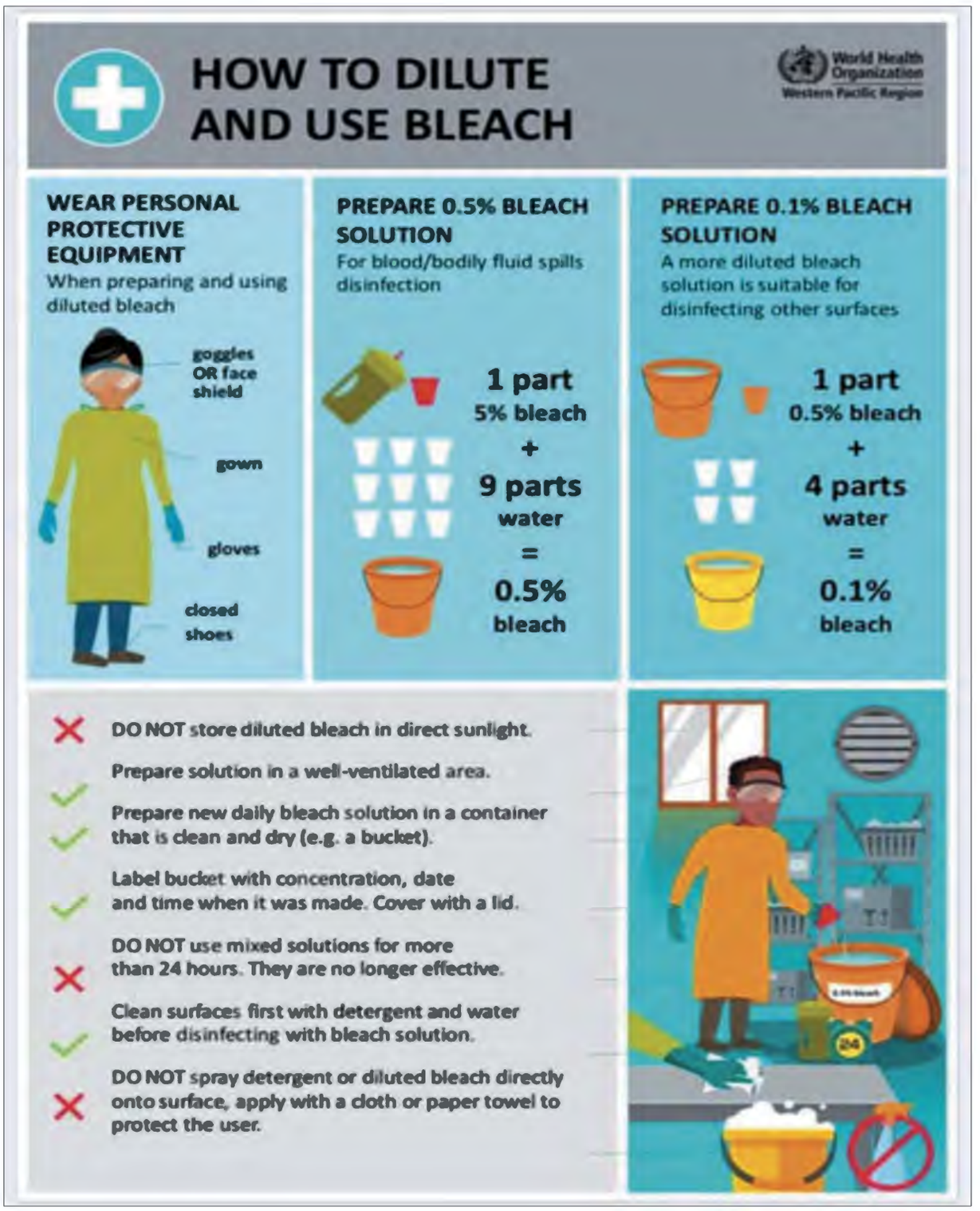
1 While working in the patient care area, outer gloves should be changed between patients and prior to exiting (change after seeing the last patient)

2 This technique requires properly fitted gloves. When outer gloves are too tight or inner gloves are too loose and/or hands are sweaty, the outer gloves may need to be removed separately, after removing the apron.

3 Appropriate decontamination of boots includes stepping into a footbath with 0.5% chlorine solution (and removing dirt with toilet brush if heavily soiled with mud and/or organic materials) and then wiping all sides with 0.5% chlorine solution. At least once a day boots should be disinfected by soaking in a 0.5% chlorine solution for 30 min, then rinsed and dried.

World Health Organization

## Appendix 8: How to prepare chlorine.



# Appendix 9: Cleaning SOP

**Environmental Cleaning Routine**

**Cleaning schedule, methods and frequencies**
Cleaning should be carried out in a planned manner and cleaning schedules should be drawn up for each area and include all equipment, fixtures and fittings. There must be clearly defined responsibility for both the cleaners and nursing staff; cleaners are generally responsible for cleaning and maintaining non-clinical equipment while nursing staff are responsible for the cleaning of clinical equipment - unless these tasks are delegated by mutual consent. Training must be provided.

Checklists must be aligned to the cleaning schedule and include signature of cleaning staff with every session and signature of supervisor, daily for validation.

Frequently touched surfaces are a high-risk for cross-transmission because they are contaminated with the pathogens that are transferred from people's hands. Items such as door handles, light switches, patient monitors and medical equipment buttons/knobs are frequently touched by health workers and patients.

Most areas of a health facility will require at least daily cleaning. See **Table 1**

**Table 1: Routine cleaning procedures**

| Area | Cleaning method | Equipment | Frequency |
|---|---|---|---|
| **Floors**<br><br>Continuous smooth flooring is recommended for health establishments | 1. **Static head mopping**:<br>• Remove dirt and dust on the floors before commencing with wet mopping.<br>• Starting from the furthest area away from the door, the static head mop is run along the edges of the floor. Once all the mopping is done, all the debris is collected into the appropriate bag. | Head mop or microfiber sleeve and detergent | Daily and immediately after spills, excluding blood and bodily fluids |
| | **2. Wet mopping:**<br>Immerse the mop in the water with detergent, wring out the mop, follow a systematic method, ensuring that all areas of the floor are covered paying particular attention to the corners. Rinse off intermittently throughout the | | Daily and immediately after spills, excluding blood and bodily fluids |

| | | | |
|---|---|---|---|
| | moping process. If the water becomes discoloured, and/ or when moving to another area, the bucket must be emptied, washed and refilled with clean water and detergent. Dry floors to prevent slips and falls. | | |
| | **3. Scrubbing/stripping:**<br><br>Scrub floors frequently. Commence scrubbing from the furthest point and towards the cleaner. Mopping and scrubbing of corridors should be done first on one half of the corridor then the other side to ensure that there is<br><br>a dry area where people can walk without any risk of slipping and falling. After scrubbing the main section of the floor, edges of the floor should be manually scrubbed with the scouring pad. The entire floor is then<br><br>thoroughly mopped and dried. | | Monthly |
| | **4. Floor sealing and polishing:**<br><br>It is recommended that scrubbed floors be sealed to ensure that the floors remain clean and shiny but not slippery. Floor sealing is commonly applied to vinyl floors. | | Monthly |
| **Walls** | High dusting must be performed using a clean damp duster or vacuum cleaner (for cornices). Walls must be damp-wiped or spot-cleaned as needed. | Clean damp duster Vacuum cleaner | At least weekly |
| **Windows** | At least two people stand on both sides of the glass and working simultaneously to clean it. Apply glass cleaner onto the glass surface. Using a squeegee, paper or a cloth, the cleaning chemical is applied liberally onto the surface while ensuring that all edges and corners as well as the centre are cleaned. Use the cloth or paper towel for buffing and removing all smears and wetness. | A non-ammoniated, streak free glass cleaner, squeegee, paper or a cloth | As needed |

| | | | |
|---|---|---|---|
| **Patient and communal toilets and bathrooms** | Special attention must be given to the toilet, sink, fixtures and the floor. Towel and toilet paper dispensers must be refilled. Soap dispensers must be replaced as needed. All surfaces, fixtures and fittings, including doors<br>and door handles are also washed with detergent. Mirrors are washed with<br>non-ammoniated, streak free glass cleaner thus ensuring that all smears are removed. | Ammonia-based detergent | Bathrooms- Daily<br>Toilets – Scheduled cleaning<br>throughout the day |
| **Horizontal surfaces - windowsills, chairs, over-bed tables and bedside cabinets** | Wiping with damp cloth | Detergent | • Daily |
| **Sluice rooms** | The flush of a sluice pan is pulled to allow entry of clean water in the basin. The area within the rim and bowl of the sluice basin is sprayed with detergent and left for a few minutes to activate. All debris is removed using a scourer, rinsed and<br>wiped dry. | Detergent, scourer | • Daily or as and when required |
| **Food service areas** | Kitchen surfaces should be clearly marked as food preparation areas - uncooked and cooked. All surfaces must be washed with warm, soapy water intermittently. At the end of a session, clean thoroughly and wipe over with a chlorine disinfectant of appropriate strength.<br>Remove all items inside the refrigerators and cupboards and wipe down with a cloth and detergent at least weekly or more frequently when indicated. All the rubber seals around the door and over the outside surface should be wiped clean with a wet cloth. Dishwashers/ sterilizers should | Water, detergent, chlorine strength disinfectant, cloths, | • Daily |

| | | | |
|---|---|---|---|
| | be emptied, and the bottom base removed and cleaned daily. | | |
| **High touch surfaces** | Wiping of bed railings, doorknobs, and handles. | Wiping cloths, detergent-disinfectants | • Daily |
| **Low touch surfaces** | Between the bed frame and mattress, and other low touch surfaces | Wiping cloths, detergent-disinfectants | • Daily |
| **Waste baskets/bins** | All waste baskets/bins must be emptied and re-lined with new impervious plastic liners. Bins must be cleaned with detergent at least weekly and whenever there is seepage. | Plastic liners | • Emptied at least three times a week or daily |

## Appendix 10: Types of pests and their control

This SOP is for all health facilities both private and public.

### PURPOSE

The purpose is to address Pest control challenges within HCF to prevent transmission of micro-organisms that causes diseases.

### RESPONSIBLITIES

- The Environmental Health Practitioners (EHP) and or IPC Focal Person are responsible for co-coordinating the development and implementation of the pest control program with the assistance of the Infection Control Team.
- The Director General is responsible for ensuring that there are enough resources allocated to the implementation of the pest control program.
- The EHP/IPC Focal Person is responsible for ensuring that the pest control program is implemented according to plan.
- It might be necessary to consult a Pest Control Company.
- Health workers are responsible for identifying and reporting all pest control challenges to the EHP/IPC persons.

### PROCEDURE

- All HCF should develop and effectively implement a pest control program for e.g., cockroaches and mice.
- Cockroaches and mice control should be done at least once per quarter in Hospitals and twice per year in Clinics and Health Centers
- No fumigation should be used and alternatives such as gels and non-aerosols pesticides should be used.
- The drainage system and wards should be treated at the same time.
- Pesticides should be rotated to avoid resistance especially in cockroaches.
- The status of Pest Control within HCF should be regularly discussed in IPC meeting at least once per quarter.

### CONCLUSION

Maintenance of good household and environmental hygiene is of paramount importance in all health facilities in maintaining a pest free environment.

### IMPORTANT INFORMATION ABOUT PESTS

Pests can serve as agents of the mechanical transmission of micro- organisms, or as active participants in the disease transmission process by serving as a vector. They are more often the result of neglect, thriving in unsanitary conditions.

Health workers should know which pests and plagues are harmful to man, what diseases they may cause and how to prevent and control these health hazards. Where applicable, a pest control program for each health facility should be designed and implemented.

General control measures include:

- Maintaining good household and environmental hygiene
- Ensuring the proper storage and handling of food in a clean environment
- Reporting the first signs of pests to the health facility administrator
- Pets and personal effects (toys, flowers etc.) should not be allowed in critical care situations e.g., ICU or treatment area of highly infectious cases.
- Linen contaminated with pests should be separated from other linen. They should be

placed in a clear bag labelled as “infested”.

- Gauzed screens of doors and windows to prevent flies and mosquitoes from entering the clinical areas.

## Different Pests and the prevention and control

| Name | Characteristics | Prevention | Control |
|---|---|---|---|
| **Bedbugs**<br>The species that mostly attack man are: *Cimex lectularius* and *Cimex hemipterus.* | Feed on human blood and the blood of chickens, household pets and rodents.<br>Feed at night and hide during the day in cracks of buildings, furniture and bedding.<br>The bite causes irritation and lack of sleep. There is no known disease spread by bedbugs. | Maintain good environmental and household hygiene `<br>Repair cracks and crevices in furniture and floors<br>Disinfect furniture and mattresses regularly, place in sun | Report to local Health Inspector and eradicate according to Environmental regulations.<br>General Health Regulation GN 121 of 1969, as amended. |
| **Cockroaches** | Live on decomposed organic material, especially food containing starch, sugar, and meat, dairy as well as vegetables.<br>Hide in cracks and holes.<br>Feed mainly during the night.<br>They prefer heat but can survive in extreme cold and even in steam pipes and drains.<br>They carry a variety of microorganisms and deposit it on food and work surfaces. | Maintain good environmental hygiene.<br>Store food in packaging material to prevent contamination.<br>Prevent build-up of dirt by regular environmental cleaning.<br>Continue to check for breeding grounds.<br>Regularly destroy cockroaches, using approved insecticides. | Do not put food in bed lockers or any other unauthorized place in hospital.<br>Report sightings of cockroaches to the local EHP. |
| **House Fly (Musca Domestica)** | Can transmit pathogens from refuse to human food. It cannot digest solids, it spits a drop of moisture on food to make it easier to eat and in this process it excretes its waste matter on the food. The fly’s sticky feet and hairy legs also carry microorganisms.<br>It can transmit diseases such as typhoid fever, poliomyelitis, dysentery, trachoma, cholera and gastroenteritis.<br>Houseflies can cause secondary infection if their larvae hatch in the wounds of patients or in food. | Clean and wash bin regularly or use plastic to line bin.<br>Remove garden and other waste, which cannot be placed in a refuse bin.<br>Ensure all food and drinks are properly covered at all times.<br>Fit all windows and doors openings with gauze screens in wards and clinical areas. | Refuse must be placed in closed bins that are cleaned regularly.<br>Refuse needs to be removed regularly from the premises.<br>Environmental regulations. General Health Regulation GN 121 of 1969. |
| **Fleas** | Lay eggs in cracks of building and floors and this is where larvae are found.<br>Feed exclusively on the blood of hosts but can survive for up to 125 days without food. They feed on humans, dogs, rodents, cattle, pigs and badgers.<br>Bites are itching, and scratching may lead to secondary infection. | Maintain good environmental and household hygiene. De-flee pets regularly.<br>Exterminate<br>Rat proofs should be compulsory for houses and institutions. | Use insecticide on visible fleas.<br>Educate community on prevention.<br>If ward becomes infested, remove patients and spray ward and disinfect.<br>Report and investigate for rodents. |

| | | | |
|---|---|---|---|
| | The human flea can transmit Bubonic plague and Typhus from rats to man and from man to man. | | |
| **Lice (Pediculosis) Different species:**<br>**Head louse (pediculus humanus)** capitis, found on nape of neck and behind ears**.**<br>**Body louse (pediculus humanus)** corporis found on body, axillae and around waist.<br>**Crab louse (phthirus pubis**) or pubic louse. | The pediculus humanus is about 2-3 mm in size, larger than the phthirus and has a greyish white colour.<br>The eggs of the louse, called nits attached to hair, gets into creases in bedding and hatches from it.<br>Lice live on the blood of the host.<br>The bites cause irritation and itching. Scratching may lead to secondary infection.<br>Diseases are transmitted to man when scratching introduces the excreta or vomitus of infected lice into the abrasion of the skin. Such diseases include Louse borne Typhus, Relapse Fever and Trench Fever.<br>Spread by direct contact of heads or bodies. | Inspect shared accommodation and children's hair regularly.<br>Prevent overcrowding in schools and hostels.<br>Prevent sharing of combs, toiletries, caps and hats.<br>Wash bedding and clothing in hot water.<br>Children with lice infestation should not be allowed attending school until deloused and no nits are present.<br>Control measures are based on good personal hygiene by bathing regularly with special attention to hair as well as combs | Managing lice in HCF:<br>Wear PPE<br>Delousing patient in a single room.<br>Shaving of hair is not necessary.<br>Send infested linen to the laundry in a marked clear plastic bag.<br>W wash hair with soap, apply Benzyl Benzoate or paraffin onto affected areas. Cover the head for 24-48 hours, wash again and comb hair with a fine comb to remove nits. Repeat treatment after 1 week. Educate patient and family. |
| **Mosquitoes** | Mosquitoes breed in shallow still pools of water, and especially in damp areas with little sunlight.<br>It may host the malaria parasite and can cause disease. Refer to the National Malaria Guideline. | **Endemic areas:**<br>Educate the community to:<br>Prevent mosquitoes breeding in standing water by adding a few drops of paraffin or diesel to water.<br>Protect themselves from bites by wearing protective clothing, use skin repellent and mosquito nets. | Treat possible breeding grounds and domestic houses according to local health authority regulations, prior to the malaria season.<br>Treat hospital premises with long-acting insecticides, if required. Install mosquito netting in HCFs. |
| **Rodent Control**<br>House mouse, roof rat and the Norwegian or common rat.<br>Wild rodents include prairie dogs, ground squirrels and gerbil species**.** | Rodents can spread the plague.<br>Other diseases that can be spread by rodents include:<br>Rabies (bitten by a rabid animal)<br>Salmonella (food eaten that is contaminated by rodent faeces) | Notify health authorities of suspicious cases of illness or mortality of domestic or wild rodents.<br>**Suspected:** Premises should be vacated, inspected and treated accordingly.<br>Unsanitary, dilapidating buildings and premises should be vacated and demolished. Maintain good environmental hygiene and housekeeping.<br>Regular inspection by the local Health Inspector of food premises and general stores. | Eradicate rodents by baits, trapping. |

| | | | |
|---|---|---|---|
| | | Remove refuse promptly according to regulations.<br>Store food and food products in rodent proof containers | |
| **Scabies**<br>*Sarcoptes Scabiei,* a mite. It spreads by bodily contact due to prolonged, close contact. | The mites cause redness, inflammation and itching of the skin. Scratching may aggravate the inflammation and vesicles and scabs may become infected and result in septic sores.<br><br>Classic distribution of lesions:<br>Hands, particular at the webs of the fingers<br>Anterior surfaces of the wrists, elbows<br>The belt line.<br>Genital area and breast area (in females particularly) in adults<br>Lesions may be found on other parts of the body. | Wear PPE when treating affected individuals<br>Remove bedding and linen and place in green linen bag, sealed for laundry.<br>Treat all members of the family and any other contacts.<br>Continue to maintain good personal hygiene | Educate the community.<br>Maintain good personal and environmental hygiene.<br>Avoid sharing of bedding and clothes in overcrowding conditions.<br>Avoid contact with an infected person.<br>Avoid scratching to prevent inflammation |
| **Ticks** | Ticks can transmit serious diseases to domestic animals.<br>The bite of a tick causes irritation and the wound may become infected.<br>Ticks transmit the following diseases to man:<br>Tick-bite fever, spread by the hard veld tick Relapsing fever, from lice or ticks.<br>Crimean Congo Haemorrhagic fever, spread by the Hyalomma (bont-leg tick). Refer to management of Viral Haemorrhagic Fever<br>Rocky Mountain spotted fever and Q –fever | Wearing PPE when exposed to the risk of tick contamination.<br>De-ticking of clothes after exposure<br>De-ticking of domestic animals. (Do not allow into house or onto beds)<br>Use insecticides and pesticides. | Take adequate precautions during possible exposure such as highking, hunting, slaughtering of animals. |

# APPENDIX 11: TBPs for Clinical Conditions

**Table 64: Clinical Syndromes/Conditions Warranting Empiric Transmission-Based**

| Clinical Symptom or Condition | Empiric TBPs[1] | Duration of Precaution[2] | Additional symptoms[3] | Potential pathogens based on additional symptoms[4] | Potential Pathogen- Specific | Duration/Comments for potential pathogen-specific precautions |
|---|---|---|---|---|---|---|
| **DIARRHEA:** Acute diarrhoea with a likely infectious cause in an incontinent or diapered patient | **C** | Duration of Illness | Fever, malaise, anorexia, nausea, abdominal discomfort | Hepatitis A virus | **C** | Infants and children <3 years age = duration of hospitalization; children 3-14yrs = 2 weeks after symptom onset; > 14yrs = 1 week after onset of symptoms |
| | | | Nausea, Vomiting | Enteric pathogens (e.g., *C. difficile, Cholera, Escherichia coli* O157:H7, Noroviruses, Rotavirus, *Shigella spp*) | **C** | Duration of Illness or to control institutional outbreaks |
| **MENINGITIS:** Fever, headache, neck stiffness, altered mental status, nausea/ vomiting | **ALL** | Duration of 24 hours or until patient has three negative sputum smears for AFB | Coryza, pharyngitis, exanthem, myositis | Enteroviruses | **C** | For infants and children |
| | | | Cough, fatigue, night sweats, weight loss, pleuritic pain | *M. tuberculosis* | **S** | Duration is until patient has three negative sputum smears for AFB OR if an- other diagnosis explains clinical syndrome.<br><br>If pulmonary infiltrate then Airborne Precautions. If potentially infectious draining body fluid pre- sent, Airborne & Contact Precautions. |
| | | | Photophobia | *Neisseria meningitidis* | **D** | Droplet Precautions for first 24 hours of antimicrobial therapy; mask and face protection for intubation. Postexposure chemo-prophylaxis for |

| Clinical Symptom or Condition | Empiric TBPs[1] | Duration of Precaution[2] | Additional symptoms[3] | Potential pathogens based on additional symptoms[4] | Potential Pathogen- Specific | Durations/Comments for potential pathogen-specific precautions |
|---|---|---|---|---|---|---|
| | | | | | | household contacts, HCWs exposed to respiratory secretions; postexposure vaccine only to control outbreaks. |
| **RASH Or EXANTHEMS** | **ALL** | D for 24 hours then C for 3 weeks, or duration of illness if illness is longer than 3 weeks | Petechial/ecchymotic With fever (general) & If positive history of travel to an area with an ongoing outbreak of VHF In the 10 days before onset of fever | Ebola, Lassa, Marburg viruses (see also next section) | **C& D** | For duration of illness. Contact & Droplet Precautions, with face/eye protection, emphasizing safety sharps and barrier precautions when blood exposure likely. Use N95 or higher respiratory protection when aerosol generating procedure performed |
| | | | Maculopapular with cough, coryza, and fever | Rubeola (measles) virus | **A** | Duration of 4 days after rash onset and for duration of illness for immunocompromised. Immune HCWs preferable. Higher respiratory protection when aerosol generating procedure performed. Exposed HCWs must be excluded from exposure to day 21 after last exposure, regardless of post-exposure vaccine |

| Clinical Symptom or Condition | Empiric TBPs[1] | Duration of Precaution[2] | Additional symptoms[3] | Potential pathogens based on additional symptoms[4] | Potential Pathogen- Specific | Duration/Comments for potential pathogen-specific precautions |
|---|---|---|---|---|---|---|
| | | | Petechial/ecchymotic with Fever (general) | Neisseria meningitidis | **D** | Droplet Precautions for First 24 hours of antimicrobial therapy; mask and face protection for intubation. Post exposure Chemoprophylaxis for household contacts, HCWs exposed to respiratory secretions; post exposure vaccine only to control outbreaks. |
| | | | Vesicular | Herpes simplex | **C& A** | Until lesions dry and crusted |
| | | | Vesicular | Varicella-zoster (shingles) | **C& A** | Duration of illness. Immune HCWs preferable |
| | | | Vesicular | Variola (smallpox) | **C& A** | Airborne and contact precautions for duration of illness which is until all scabs have crusted ad separated approximately 3-4 weeks. Immune HCWs preferable |
| | | | Vesicular | Vaccinia viruses | **C** | Until lesions dry and crusted, scabs separated. Vaccinated HCWs preferable. |
| **RESPIRATORY INFECTIONS:** Cough, fever, pulmonary infiltrate | **ALL** | Longest period of time from either: 5 days from onset of symptoms, duration of illness, or until patient has three negative sputum smears for AFB | Cough/fever/ pulmonary infiltrate in any lung location | *M. tuberculosis*, Respiratory viruses, S. pneumonia, S. aureus (MSSA or MRSA) | **D & A** | Duration is until patient has three negative sputum smears for AFB OR if another diagnosis explains clinical syndrome<br><br>Use eye/face protection if aerosol-generating procedure performed or contact with respiratory secretions anticipated. If *M. tuberculosis* unlikely and no respirators available, use Droplet Precautions instead of Airborne Precautions if patient is HIV-positive |

| Clinical Symptom or Condition | Empiric TBPs[1] | Duration of Precaution[2] | Additional symptoms[3] | Potential pathogens based on additional symptoms[4] | Potential Pathogen- Specific | Duration/Comments for potential pathogen-specific precautions |
|---|---|---|---|---|---|---|
| | | | Cough/fever/ pulmonary infiltrate in any lung location in a patient with a history of recent travel (10-21 days) to countries with active out- breaks of SARS, avian influenza | *M. tuberculosis*, severe acute respiratory syndrome virus (SARS-CoV), avian influenza | **D & A** | Duration is until patient has three negative sputum smears for AFB OR if another diagnosis explains clinical syndrome. If pulmonary infiltrate then Airborne Precautions.<br>If potentially infectious draining body fluid pre-sent, Airborne & Contact Precautions. Include eye protection.<br>If SARS and tuberculosis unlikely, use Droplet Precautions instead of Airborne Precautions |
| | | | | SARS-CoV-2 | **C, D, A** | In addition to standard precautions, all individuals, including HCWs and caregivers, should use contact and droplet precautions before entering room where suspected or confirmed COVID-19 patients are admitted. Contact and droplet precautions should only be discontinued in consultation with clinicians and should take into consideration resolution of clinical signs and symptoms, or the number of days since a positive test was carried out with an upper respiratory specimen by molecular assay. For symptomatic patients, these additional precautions can be discontinued 10 days after symptoms onset AND at least three consecutive days with neither fever nor respiratory symptoms. For asymptomatic patients, isolation can end 10 days after the initial positive RT-PCR test result |

| Clinical Symptom or Condition | Empiric TBPs[1] | Duration of Precaution[2] | Additional symptoms[3] | Potential pathogens based on additional symptoms[4] | Potential Pathogen- Specific | Duration/Comments for potential pathogen-specific precautions |
|---|---|---|---|---|---|---|
| | | | Respiratory infections, particularly bronchiolitis and pneumonia, in infants and young children | Adenovirus, Human metapneumovirus, Influenza virus, parainfluenza virus, Respiratory syncytial virus | **C & D** | 5 days from onset of symptoms or duration of illness-whichever time period is longer. May need Contact & Droplet Precautions. Droplet Precautions may be ruled out when adenovirus and influenza has been ruled out. |
| **SKIN or WOUND INFECTION** | **C & D** | Up to 24 hours | Abscess or draining wound that cannot be covered | *Staphylococcus aureus* (MSSA or MRSA), group A streptococcus | **C & D** | *Contact & Droplet Precautions* for the first 24 hours of appropriate antimicrobial therapy if invasive Group A streptococcal disease is suspected |

**Infection control professionals should modify or adapt this table according to local conditions. To ensure that appropriate empiric precautions are implemented always, hospitals must have systems in place to evaluate patients routinely according to these criteria as part of their preadmission and admission care.*

1. *Most conservative set of Transmission-based Precautions and Duration of Precaution use, based on Clinical Symptom*
2. *Based on CDC's 2007 "Guidelines for Isolation Precautions", Heymann's 19th edition "Control of Communicable Diseases Manual", and the "Red Book: 2009 Report of the.....XXX*

# Appendix 12: Specimen Collection

### Microbial Specimen Collection

There must be a good communication between the IPC Team and the microbiology department. The samples should be taken as shown below to give optimal results and allow informed IPC practices. The table below summarises the site and the type of specimen, transportation and outcome. The appendix section has SOPs for taking various important specimens to yield the best results.

Good IPC risk assessment and appropriate treatment is dependent on good microbiological support. This requires:

- Completing the laboratory form with all required patient details, site of sample, date, time, clinical diagnosis and location of patient.
- Taking an adequate microbiological sample.
- Minimum contamination of the specimen during sampling, storage and transportation.
- **ALWAYS USE A STERILE CONTAINER WHEN COLLECTING AND SENDING SAMPLES FOR MICROBIOLOGY.**
- **NEVER RECYCLE LABORATORY SPECIMEN CONTAINERS AS THEY MIGHT BE CONTAMINATED.**

**Table 1: Examples of specimen and sampling techniques**

| Specimen type | Sample and Transportation | Reason |
|---|---|---|
| Blood culture | Aseptic technique required. If blood drawn required for multiple tests, inoculate B/C bottle first.<br>Number, timing and sites may vary depending on the suspected diagnosis. | To avoid skin contamination. Prevent contamination from other containers- false results. **Ideally take samples before starting antibiotics.** |
| Cerebro-spinal fluid (CSF) | Send the cloudiest CSF sample for microbiological processing. Transport to the lab immediately - if this is not possible, keep at room temperature - does not refrigerate. Try and send as much as you can. | Cloudiness often indicates presence of bacteria. *N. meningitidis* and *H.influenzae* are very susceptible to cold. Greater volumes increase the chance of organism recovery. |
| Eye swabs | Transport to lab as soon as possible. | Plate out immediately- lysozymes present which kill bacteria. |
| Endotracheal aspirate (ETA) | Only take if infection/sepsis suspected. | Results usually reflect bacterial colonisation and are unreliable.<br>Use clinical parameters to treat. |
| Faeces | Transport to the lab as soon as possible. Try not to contaminate with urine. | Metabolites can destroy pathogenic bacteria. |

| | | |
|---|---|---|
| MRSA screening swabs | Moistened swab of first 3 – 5 mm of anterior nares (nose) and hairline. | *S.aureus* carried in nose<br>Screening of hairline (- a frequently touched area) increases yield. |
| Rectal swab | Moistened swab from anus. | Good yield for some organisms |
| | | (e.g., *Shigella* species) if stool not available. |
| Samples from sterile sites | Aseptic technique required.<br>Send sample in a sterile screw- capped container. | Avoid contamination.<br>Prevent leakage /contamination. |
| Serology | Sterile sample in appropriate container. | Contamination leads to haemolysis |
| Sputum | Early morning specimen preferred.<br>Make sure it is not saliva/spit. | Best yield for all pathogens especially *Mycobacterium tuberculosis*. |
| Urine | Send in sterile container. Refrigerate if immediate transport to the lab is not possible. | Prevents multiplication of bacteria (analysis for urine is quantitative which means it is the number of bacteria present at the time of sampling that needs to be measured). |
| Urethral Swab | Gently introduce a fine wire swab approximately 3cm into the urethra and rotate several times. Place in transport media and send immediately to laboratory for smear and culture. | If heavy discharge takes ordinary swab from the urethral meatus. Send for culture immediately for best results. |
| Vaginal swabs | Inoculate plates at bedside or transport to the lab immediately. | *N. gonorrhoea* is susceptible to cold. |
| Virology | Separate sample of blood required for serology.<br>Tissue for virology needs to go into viral transport media. | Contaminants can give false serological results.<br>Viral transport media helps keep fragile viruses alive. |

# Appendix 12 (a): SOP for Collecting Blood for a Blood Culture

**Blood culture specimens**

Blood cultures are a very important sample because they are the most reliable indicator of infection. Blood is considered sterile body fluid therefor organisms cultured has to be considered a potential pathogen. The collection of a **blood culture MUST BE METICULOUS** otherwise the sample might be contaminated with micro-organisms from the skin and surroundings. Specimens should be transported to the laboratory promptly and placed in an incubator (in the lab) as soon as possible.

**Recommended number and timing**

A minimum of one set ( 2 aerobic bottles) is recommended to get an optimum yield. Anaerobic cultures are not routinely necessary but can be done if clinically indicated.

*Suspected endocarditis:* 3 sets (from 3 different sites taken 30 minutes apart (note, these do not need to coincide with fever spikes)

*Pyrexia of unknown origin:* send 1 set initially. Send a further 2 sets during fever spikes ideally 24-36 hours after the initial set. Sending more than 4 sets does not increase the yield of positive cultures significantly.

*Patient on antimicrobial therapy*: it may be necessary to take sets on 3 consecutive days or take blood into a resin blood culture bottle to remove antimicrobial agents.

## 1.1 Specimen volume

The volume is important because there might not be many organisms in the blood. More volume gives a better chance of isolating the bacteria, and hence getting the right treatment options. Smaller amounts are required in children and neonates because the circulating volume is lower (hence more bacteria/ml of blood).

See side of bottle OR

- Adults 10ml per bottle
- Children 3-5ml per bottle
- Neonates 1-3ml er bottle

## 1.2 Quality control

- Store blood culture bottles in a cool, dry, dark place NEVER UNDER THE HAND WASH BASIN OR IN THE SLUICE
- Always check the expiry date before use
- Discard any bottles where the liquid looks turbid, or the colour has changed.

## 1.3 Specimen collection- the method

Equipment needed:

- 70% alcohol plus chlorhexidine (0.5% to 2%)
- 1 set of blood culture bottles (+ anaerobic bottle if clinically indicated) 2x alcohol swabs.
- 20ml syringe
- Needle (take 2-3 in case of missed venepuncture)
- Sterile cotton wool balls
- Sterile Gloves
- Tourniquet
- Facility for hand hygiene (soap &water OR alcohol rub)
- Sharps container

*Taking the blood culture:*

- Make sure you have all your equipment ready.
- Perform hand hygiene.
- Explain the procedure to the patient and why you need the sample.

- *Site selection*:
  - Select a different site for each set of cultures.
  - Avoid drawing blood through indwelling catheters (venous or arterial)
  - If you do take cultures from a line label them as such, and take a peripheral set of cultures at the same time (this helps assessment of line associated infection)
- *Site preparation:*
  - Clean the site with 70% isopropyl alcohol and allow to dry.
  - DO NOT TOUCH THE VENPUNCTURE SITE AGAIN
- *Disinfecting blood culture bottles:*
  - Disinfect the top of each bottle with a separate alcohol swab.
- *Collection of blood:*
  - Put on gloves.
  - Apply the tourniquet.
  - Use a 20ml syringe and needle or vacuum tube system if available insert the needle into the vein and draw blood.
  - Cover puncture wound appropriately.
  - Do not change the needle before injecting the required amount of blood into each blood culture bottle.
  - After the bottle has been injected into the bottle, mix well If you miss the vein, use a new needle to try again Remove gloves.
  - Perform hand hygiene.

## 1.4 Specimen Labelling

Do not stick patient labels over the barcodes or the bottom of the bottle. These are necessary for the blood culture machines to incubate the samples correctly. In addition to routine information, it is essential that the patient's request form accurately reflects the patient's diagnosis and any other underlying factor

## 1.5 Specimen Transport

Specimens should be transported to the laboratory promptly or some organisms which are sensitive to temperature and atmospheric changes may die.

# Appendix 12 (b)SOP Intra Vascular Catheter Tip Collection

### IV catheter tip specimens

IV catheter tips are not useful to diagnose line associated infection. They are mostly colonised and contaminated with skin flora. However, if they are collected, is must be accompanied by an aseptically collected blood culture. They can also become contaminated with normal skin flora on removal. The following IV catheters are often sent for culture: Arterial, Broviac, Central, CVP, Hickman, hyperalimentation, peripheral, Swan-Ganz, and Umbilical. **This is however a practice that should be discouraged.**

### Specimen Collection

- E**quipment needed:**
  - Sterile tube Alcohol swab
  - Dressing for puncture wound upon removal Clean scissors
  - Clinical waste bin
  - Sterile Gloves
  - Facility for hand hygiene (soap and water OR alcohol rub)
- **Collecting the IV catheter tip**
  - Perform hand hygiene, and explain the procedure to the patient Put on gloves
  - Remove dressing around IV catheter and discard in clinical waste
  - Clean around the IV entry site with the alcohol swab, and allow to dry
  - Aseptically remove the IV catheter and apply pressure (or ask patient to apply pressure)
  - Slip 5cm of the distal tip directly into a sterile tube
  - Cap tube and label with patient details/sticker
  - Apply dressing
  - Remove gloves Perform hand hygiene

### Specimen Labelling

In addition to routine information, it is essential that the request form accurately reflects:

- Patient's diagnosis or other underlying factors that may influence laboratory decisions or how to process the specimen further (e.g. prolonged incubation, fastidious organisms) should be indicated.

### Specimen Transport

Transport IV catheter tips to the laboratory as soon as possible after collection to prevent the tip drying out and the bacteria dying.

# Appendix 12 (c): SOP Sputum Collection Using Sterile Collection Pots

**Sputum specimens: timing and transport**

It is important to remember that aerosols containing TB bacteria may be produced when the patient coughs to produce a sputum sample. For this reason, it is best for the patient to produce the sample in the open air, or away from other people, and not in confined areas with poor ventilation (i.e. toilets.) For more information on collection of sputum samples in the context of TB consult the TB IPC Guidelines.

It is best to collect a sample early in the morning before a patient has eaten or taken medication. Send all samples to the laboratory promptly to ensure that organisms remain viable. If this is not possible please refrigerate till transport to the lab is available. Do not freeze.

**Specimen Collection**

**Sputum sample for MC&S**

Equipment needed:

- Sterile collection pot
- Glass of water

Give the patient clear instructions on why you need the sample and how to take a specimen. Explain the difference between sputum and saliva/spit.

- Give a sterile container to the patient
- Ask the patient to rinse his/her mouth with water
- Ask the patient to take 2 deep breaths (holding the breath after each inhalation, and exhaling slowly)
- The patient should hold the container against the lower lip, cough, then release the sputum from the mouth directly into the container
- Ask the patient to then re-cap the container and then hand it to a member of staff Label the container with the patient's details/patient sticker

**If TB is a possible diagnosis**

*Mobile patients*: Send the patient outside or to a designated cough room to produce the sample.

*Bed-bound patients*: Give the patient a sterile container, and only ask the patient to cough after you have left the patient, and drawn the bed-curtains. The bed- curtains must remain closed around the patient for 15 minutes after the sample is produced.

**Induction of sputum for the isolation of Pneumocystis jerovecii (PCP)**

- Equipment needed:
- Sterile collection pot
- Toothbrush
- 20-30mls hypertonic saline (3-5%)
- Nebuliser and mask

Explain the procedure to the patient and explain why it is necessary. Explain the difference between sputum and saliva/spit.

- Ideally fast the patient for 8 hours or take the sample before breakfast

- Prepare nebuliser with 20-30mls of hypertonic saline (3-5%)
- Patient needs to inhale the mist from the nebuliser for 10-20 minutes Give 1 or 2 sterile containers to the patient
- Collect sputum after the nebuliser is finished, as described below
- Encourage the patient to take breaths and cough deeply
- The patient should hold the container against the lower lip, cough, then release the sputum from the mouth directly into the container
- Ask the patient to then re-cap the container and then hand it to a member of staff
- Send initial sputum for MC&S, T, AFB and fungal culture
- Send the later specimen(s) for *Pneumocystis jerovecii*
- Label the container(s) with the patient's details/patient sticker

**Specimen Labelling**

In addition to routine information, it is essential that the patient's specimen label accurately reflects the mode of specimen collection and the patient's diagnosis.

**Timing of Specimen Collection**

Obtain early-morning specimens whenever possible because of increased bacterial counts and follow the local guidelines

**Specimen Transport**

- Transport the sputum sample to the laboratory as soon as possible after collection.
- Must be submitted for culture immediately after collection, or refrigerated and sent within 24 hours whenever possible.
- All specimen containers must be closed tightly to prevent leaking. If sample has grossly leaked form the container, the specimen will be rejected for processing.

**Patient Instructions**

Patients should be informed in writing and verbally, on how to give a good sample of sputum for diagnostic purposes. They must be told how to discard the contaminated tissues or sample pots after they have coughed.

**Patient Instruction**

1. Sterile sputum collection container will be given to you by your nurse/doctor
2. A label with your name and details on and space for you to write the time and date you take the sample
3. Request form
4. A glass of water
5. Somewhere to wash your hands afterwards with soap and water

**How to take a sample**:

1. Rinse your mouth out with water.
2. Try to go outside or somewhere away from people where there is good air circulation but NOT a closed space like the toilet).
3. Take 2 deep breaths holding your breath for a few seconds after you breathe in, and breathe out slowly.
4. Hold the container against your lower lip.
5. Cough, and release the sputum from your mouth directly into the container.
6. Replace the container lid and screw tightly. Make sure it does not leak.
7. Wipe your mouth with a tissue and discard in the red bag.
8. Label the container and note the collection date and time on the label.
9. Wash your hands with soap and water.
10. Refrigerate the specimens until ready for transport to the laboratory.

**Please hand your sample in as soon as possible after you have taken it. This helps the laboratory get more accurate results**.

# Appendix 12 (d): SOP Urine collection using sterile urine collection pots

## Urine specimens: collection and transport

Urine is a normally sterile body fluid. However, unless it is collected properly, it can become contaminated with micro-organisms form the perineum, urethra or vagina. The following guidelines are provided to ensure proper specimen collection and subsequent prompt delivery of urine samples to the laboratory.

## Specimen Collection

### Midstream urine specimens (MSU)

Equipment needed:

- Sterile urine collection pot

- Narrow tube

- Urinalysis dipsticks Sterile water/sterile saline
- Gloves and apron for health workers only

- Wash hands with soap and water, rinse and dry them. Health workers should wear gloves and aprons:
- **Females:** cleanse the urethral opening and the vaginal vestibule area with clean gauze pads soaked with sterile saline or sterile or clean water. Do not use disinfectants to clean the genitalia. Hold labia apart during voiding.
- **Males:** Cleanse the penis, retract the foreskin (if not circumcised), and wash with sterile saline. Keep foreskin retracted during voiding (to minimise contamination with skin flora).
- Both females and males: Allow a few millilitres of urine to pass (do not stop the flow of urine) and collect the midstream portion of urine in a wide mouthed sterile container.
- Collect voided urine directly into a sterile container; do not use a urinal or bedpan for collection.
- Unscrew the lid and decant some of the urine from the sterile collection pot into a narrow tube (wearing gloves). Replace the lid on the sterile collection pot immediately.
- Label the narrow tube with the correct patient sticker. Perform dipstick analysis on the urine in the narrow tube.
- If leucocytes are present send the sterile collection pot for MC&S, If no leucocytes are present discard the sterile collection pot in the clinical waste container.

### Catheter urine (CSU)

Indwelling urinary catheter specimens are often colonised and therefore bacterial cultures are difficult to interpret. Therefore, only take a sample if the patient has clinical symptoms or is systemically unwell.
Collect sample from the sampling port with a syringe and needle using an aseptic technique, do not collect samples from the collection bag.

Equipment needed:

- Sterile urine collection container 2 x 70% alcohol wipes
- Needle
- 5mL or 10mL sterile syringe Gloves

**Method:**

- Perform hand hygiene and put on gloves.
- Clamp catheter tubing below port.
- Clean sampling port with at least 2 separate 70% alcohol swabs and allow to dry.
- Insert needle obliquely into port and aspirate urine (5-10mL).
- Transfer to sterile container and mark correctly; “indwelling catheter urine specimen”.
- Unscrew the lid and decant some of the urine from the sterile collection pot into a narrow tube. Replace the lid on the sterile collection pot immediately.
- Label the narrow tube with the correct patient sticker.
- Perform dipstick analysis on the urine in the narrow tube.
- If leucocytes are present send the sterile collection pot for MC&S. If no leucocytes are present discard the sterile collection pot in the clinical waste container.
- Remove gloves, discard appropriately, and perform hand hygiene.
- Foley catheter tips are unacceptable for culture (MC&S).

## Specimen Labelling

**In addition to routine information, it is essential that the patient’s specimen label accurately reflects the mode of specimen collection e.g. MSU, supra-pubic aspirate AND the patient’s diagnosis**

## Timing of Specimen Collection

- Obtain early-morning specimens whenever possible because of increased bacterial counts after overnight incubation in the bladder.
- Do not force fluids in order to have the patient void urine as it will dilute the urine
- For *Schistosoma haematobium* (bilharzia), send 3 terminal urine specimens (the last part of the urine stream) for optimal detection of ova.

## Specimen transport

- Transport urine to the laboratory as soon as possible after collection.
- Urine must be submitted for culture within 2 hours after collection, or refrigerated and sent within 24 hours whenever possible.
- All specimen containers must be closed tightly to prevent leaking. If sample has grossly leaked form the container, the specimen will be rejected for processing.

**Patient's Instruction**

Instruction should be given to the patient both in writing (with a diagram if possible) and verbally.

**Patient Instruction**

**Needed for the urine sample**

1. Sterile urine collection container (will be given to you by your nurse/doctor)
2. Soap and water
3. A label with your name and details on and space for you to write the time and date you take the sample
4. Request form

**How to take a sample if you are female**:

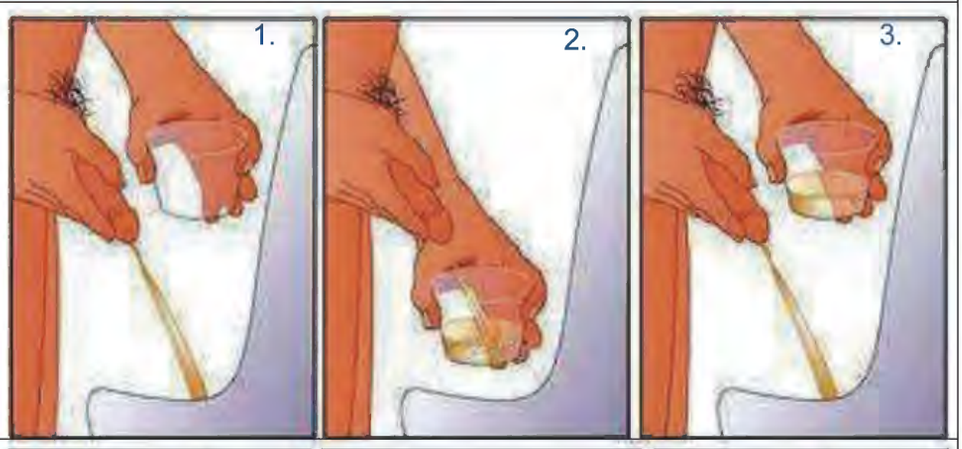
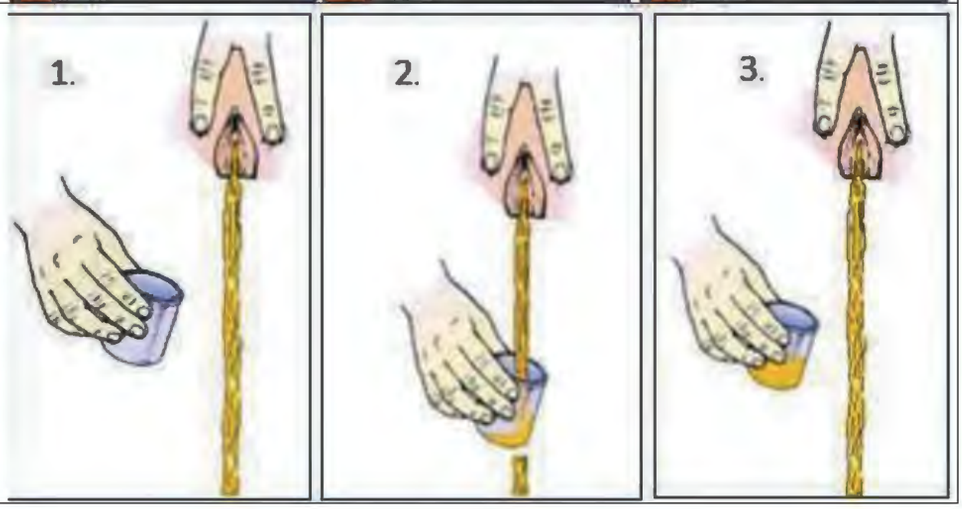
1. Wash hands thoroughly with soap and water.
2. (Separate the skin folds around the urinary opening. Wash the area with a soap and water using a front to back motion. Repeat two additional times.)
3. Begin urinating into the toilet with skin folds held apart with the fingers.
4. Insert collection container into urine stream without allowing c ontainer to touch the skin area.
5. Fill half of the container and remove from the urine stream. Replace the container lid and screw tightly.
6. Wipe the outside of the container to make sure it is dry
7. Label the container and note the collection date and time on the label. Refrigerate the specimens until ready for transport to the laboratory.

**How to take a sample if you are male**

1. Wash hands thoroughly with soap and water. (Wash the head of the penis with soap and water) Begin urinating into the toilet.
2. Insert collection container into urine stream without allowing container to touch the skin area.
3. Fill half of the container and remove from the urine stream.
4. Replace the container lid and screw tightly.
5. Label the container and note the collection date and time on the label.
6. Refrigerate the specimens until ready for transport to the laboratory

Please hand your urine sample in <u>as soon as possible</u> after you have taken it. This helps the laboratory get more accurate results.

**Diagram of how to collect a urine sample - for a male and female patient (Dr R. Edwards, 2011)**

| How to take a mid-stream urine sample | |
|---|---|
| **Males:**<br><br>1. Start to pee<br>2. Place the pot in the stream till it is half full<br>3. Finish peeing |  |
| **Females:**<br><br>1. Start to pee<br>2. Place the pot in the stream till it is half full<br>3. Finish peeing |  |

# Appendix 12 (e): SOP Faecal Collection

**Faecal specimen: timing and transport**

Specimens should be submitted to the lab as soon as possible after collection (e.g., within 1-2 hours); because acid metabolites in stored specimens can destroy the bacteria you are hoping to culture. If requesting testing for *C. difficile* and it is not possible to send the specimen immediately, please refrigerate till transportation is available.

**Rectal swabs** should be sent in a suitable transport medium and be refrigerated till transportation is available.

**Rectal biopsies** should be submitted in a sterile screw top container with a small amount of sterile water/saline to prevent desiccation (drying out).

**Specimen Collection**

**Faecal specimen:**

- Submit in a sterile screw top container.
- If there is any blood, pus or mucus in the specimen, include this in the sample sent for testing.
- Try not to contaminate the sample with urine.

**A faecal specimen in transport medium**

- Insert a sterile cotton swab into the stool specimen and rotate.
- If there is any blood, pus or mucus in the specimen, please try to include this in the sample sent for testing
- Immediately insert the swab into a tube of cold transport medium and push down completely to the bottom of the tube of transport medium
- Break off and discard the top portion of the stick (the bit your fingers touched) Recap and tighten the lid firmly
- Place the tube in a refrigerator or cool box if there will be a delay in transport

**Rectal Swab**

- Moisten the sterile cotton swab in sterile transport medium
- Insert the swab 2-3cm into the sphincter and rotate
- Withdraw and examine to make sure there is faecal material visible on the swab
- Immediately insert the swab into a tube of cold transport medium
- The swab should be pushed completely to the bottom of the tube of transport medium; break off and discard the top portion of the stick
- Recap and tighten the lid firmly
- Place the tube in a refrigerator or cool box if there will be a delay in transport

**Rectal biopsies:**

- Submit in a sterile screw top container
- Add a small amount of sterile water/saline to prevent desiccation (drying out)
- DO NOT send specimens for microbiological processing in formalin

**Specimen Labelling**

In addition to routine information, it is essential that the patient's specimen label accurately reflects:

- Patient's diagnosis or other underlying factors that may influence laboratory decisions or how to process the specimen further (e.g. E coli 0157.H7 if haemolytic uraemic syndrome is suspected) should be indicated.

**Specimen Transport**

- Transport to the laboratory immediately or refrigerate, and send within 24 hours whenever possible.
- All specimen containers must be closed tightly to prevent leaking. If sample has grossly leaked from specimen will be rejected for processing.

**Patient Instruction**

**Patient Instruction**

**What you will need to take a faeces sample:**

1. Sterile collection container will be given to you by your nurse/doctor
2. A label with your name and details on and space for you to write the time and date you take the sample
3. Request form

**How to take a sample:**

1. Fill the toilet bowl (bottom of the toilet) with enough toilet paper so that the paper is above the level of the water OR lift up the toilet seat and place a plastic bag over the toilet loosely
2. Defecate (do your poo) onto either the toilet paper, or into the plastic bag. Put a small amount of the faeces (poo) into the container you were given, if you use a spoon make sure it is washed properly after use
3. Replace the container lid and screw tightly
4. Wash the outside of the container with soap and water if you spill any faeces on the outside of it
5. Label the container and note the collection date and time on the label
6. If you used toilet paper flush the toilet as usual and wash your hands with soap and water
7. If you used the plastic bag method, remove the plastic bag and empty the contents into the toilet, flush the toilet as usual, put the plastic bag in a bin, and wash your hands with soap and water
8. Refrigerate the specimens until ready for transport to the laboratory

**Please hand your faeces sample in <u>as soon as possible</u> after you have taken it. This helps the laboratory get more accurate results**

## Appendix 13: Surveillance data collection tool

**Numerator and denominator collection tool**

**Patient identification**

**Name of the ward:**

**Month/year:**

| | |
|---|---|
| Name of the patient: | Date of admission: |
| Patient identification number: | Date of Discharge: |
| Age: | Discharge motive: |
| Gender: | Date of referral or transfer to another ward: |
| Bed number: | Date of referral or transfer in from another ward: |
| | Date of death |
| | Primary/ admission diagnose: |
| | |
| CAUTI | BSI |
| Indwelling catheter: Yes/No | Central venous catheter (CVC) or peripheral line |
| Date of indwelling catheter inserted : | Date of incision: |
| Date of indwelling catheter removed: | Date of removal: |
| Indwelling catheter total days: | CVC or peripheral line days: |
| Symptomatic urinary tract infection: | Blood culture date of collection: |
| Urine collection sample date: | Confirmed BSI date: |
| Confirmed urinary tract infection date: | Microorganism cultured: |
| Etiological agent/ microorganism cultured: | Antimicrobial resistance profile: |
| Antimicrobial resistance profile: | Antimicrobial sensitive profile: |
| Antimicrobial sensitive profile: | CLABSI OR PLABSI: |
| | |
| SSI | SSI |
| Date of operation: | Type of operation: |
| Prosthesis Yes/No | Wound classification: |
| Sample collection date: | Date symptoms started: |
| Microorganism cultured: | Confirmed surgical site infection: |
| Antimicrobial resistance profile: | Antimicrobial sensitive profile: |
| VAP | |
| Mechanical ventilation: | |
| Date mechanical ventilation was started: | |
| Date mechanical Ventilation stopped | |
| Date symptoms started: | |
| Date of VAP diagnosis: | |
| Etiological agent/microorganism cultured: | |
| Antimicrobial resistance profile: | |
| Antimicrobial sensitive profile: | |

**IPC practitioner name:**

**Signature:**

**Date:**

**Denominator**

**Name of the hospital:**

**Ward:**

| Date/month/year | No. of Patient with CVC | No. of patient with indwelling urinary catheter | No. of patient with peripheral line | No. of patient with mechanical ventilation | No of patient undergoing surgery |
|---|---|---|---|---|---|
| 1. | | | | | |
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| 28. | | | | | |
| 29. | | | | | |
| 30. | | | | | |
| 31. | | | | | |
| Total | | | | | |

**HAI data collection report table**

| Ward Name: | Number of CAUTI | Number of BSI (CLABSI &PLABSI) | Number of SSI | Number of VAP | Antimicrobial resistance profile |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**Compiled by:**

**Date:**

# Appendix 14: Bundle Checklists

## VAP (VENTILATOR ASSOCIATED PNEUMONIA) PREVENTION BUNDLE

| Item | Yes/No | Comment |
|---|---|---|
| 1.Head of bed elevated 30-45 degrees | | |
| 2.Hand hygiene performed before patient contact | | |
| 3. Sedation vacation | | |
| 4. Subglottal suctioning | | |
| 5. Oral care 6 hourly | | |
| 6. Mobilise patient to improve lung functions | | |

Name of auditing staff: …….....

Signature: .....

Date & Time: .....

## CAUTI (CATHETER ASSOCIATED URINARY TRACT INFECTION) PREVENTION BUNDLE

| Item | Yes/No | Comment |
|---|---|---|
| 1.Hand hygiene prior to catheter insertion | | |
| 2. Aseptic insertion technique | | |
| 3. Sterile solution used for preparation of meatus prior to insertion (e.g. water, saline or chlorhexine in water) | | |
| 4. Catheter secured to the leg | | |
| 5.Closed draining system maintained | | |
| 6.Unobscured flow (no kinks or blockages) | | |
| 7.Catheter bag is below the level of the bladder | | |
| 8.12 hourly catheter care | | |
| 9.Daily evaluation of necessity for catheter* | | |

***Review necessity daily and record in progress report**

Name of Auditing Staff: .....

Signature: .....

Doctor/Nurse performing the procedure: .....

Date & Time: .....

## CLABSI (CENTRAL LINE ASSOCIATED BLOOD STREAM INFECTION) PREVENTION BUNDLE

| Item | Yes/No | Comments |
|---|---|---|
| 1. Optimal insertion site chosen (subclavian, internal jugular, femoral). Circle which is appropriate. | | |
| 2. Perform hand hygiene | | |
| 3. Sterile technique<br>3.1 Sterile gloves, surgical mask, cap and sterile gown<br>3.2 Draping of the patient<br>3.3 Sterile CVP pack used | | |
| 3. Chlorhexidine skin disinfectant: area is allowed to dry prior to insertion | | |
| 4. Line secured | | |
| 5. Protective dressing clean & intact: moisture permeable dressing | | |
| 6. Review necessity daily and record, remove lines promptly when no longer needed. | | |

Name of Auditing staff: .....

Signature .....

Name of Doctor: .....

Date & Time: .....

## SSI (SURGICAL SITE INFECTION) PREVENTION BUNDLE

| Item | Yes/No | Comment |
|---|---|---|
| 1. Chlorhexidine bath done pre-operatively | | |
| 1. Optimal use of prophylactic antibiotics (within one hour of surgical incision, with correct dosage and duration; discontinuation of prophylactic antibiotics within 24 hours. | | |
| 3. Only remove hair of necessary.<br>3.1 Clipping<br>3.2 Depilatory removal<br>3.3 **No razors** | | |
| 4. Maintenance of post-operative glucose levels | | |
| 5. post-operative normothermia | | |
| 7. Skin antisepsis with appropriate agent. | | |
| 8. Site dry prior to incision | | |

Name of Auditing staff: .....

Date & Time: .....

Signature: .....

Surgeon/Anaesthetist: .....

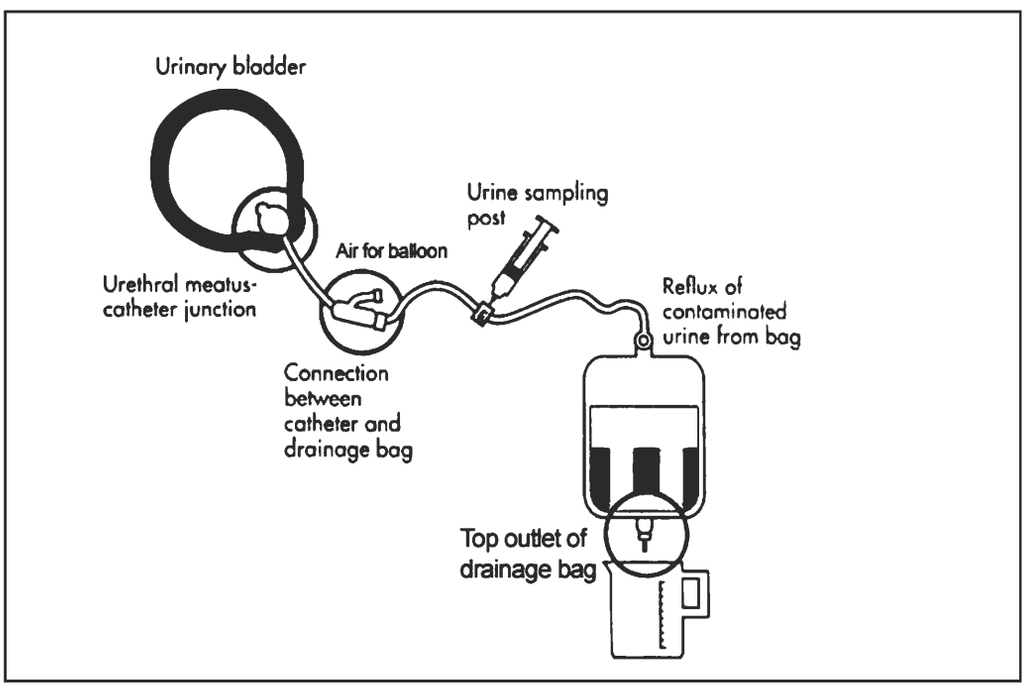
## Appendix 15: SOP Urinary Tract Catheterization

Urinary tract catheterization is an aseptic procedure, and a closed system must be maintained at all times. It is the commonest cause of HAI in high income countries, and infection usually occurs during insertion or removal of the urinary catheter. Patients should only be catheterised if clinically indicated and the catheter must be removed as soon as possible. The risk of infection increases the longer the catheter remains in-situ.

**Entry points for Bacteria**

Bacteria, both endogenous and exogenous may enter the bladder and beyond at various points during urinary catheterisation as shown in the figure 1 below. A closed circuit must be maintained to prevent bacterial colonisation and subsequent sepsis.

**Points of entry for bacteria into the urinary tract**




Procedure for urinary catheterization

- Inform the patient of the procedure.
- Lay up the trolley with all the necessary equipment:
    - Sterile gloves
    - Sterile water or Normal Saline
    - Swabs or cotton wool
    - Sterile paper towels
    - Antiseptic, anaesthetic lubricating gel
    - Receptacle for urine, or if the catheter is to be left in situ, a urine bag with tube to connect to the catheter
    - If a Foley catheter is to be used, a syringe of appropriate size and water or saline for the bulb
- Select the appropriate size and type of catheter so as to avoid trauma to the patient

- Before starting, check that all the necessary equipment is present and sterility maintained and perform hand hygiene and wear sterile gloves

**Male Catheterisation**

Keep the patient supine and with good light and visibility:

- Use the non-dominant hand to hold the penis. This hand is the non-sterile hand and holds the penis throughout the procedure. Retract the prepuce (where uncircumcised and no phimosis).
- Clean the glans.
- With index finger and thumb behind the glans, stretch the penis straight and slightly upwards to overcome the first curve of the urethra.
- Insert a few ml (5-10ml) of gel (e.g., lignocaine 2%) into the urethra to avoid urethral spasm, using the single use insertion device, if available and allow some to spill over onto the surrounding glans to lubricate the catheter's insertion as well as anaesthetise the procedure. Allow some time (2-3 minutes) for the anaesthetic gel to take effect
- To avoid urine spill, connect a collecting bag to the catheter prior to the procedure whilst others use a small collecting bowl and once flow starts, they kink the tube to obstruct it and then connect the bag.
- Allow the catheter to slip into the urethra until soft resistance is encountered, the second urethral curve. To overcome this, straighten the stretched penis, while pushing gently against the catheter.
- Once urine flow is achieved, push the catheter in as far as it will go or until the 'fork' of the catheter is reached. This is to prevent the balloon from being inflated whilst still in the prostate.
- Inflate the balloon with the appropriate amount of sterile water or saline (usually 10- 15 ml). Retract the catheter gently until there is a slight tug to indicate that the balloon is resting in the correct position against the bladder neck or prostate. Urine should flow freely.
- Taping the tube securely to the inner thigh to prevent pulling on the catheter in the bladder.
- In an uncircumcised male remember to replace the prepuce. Failure to do so will cause paraphimosis.
- Secure the urine bag with the urine stand to prevent unnecessary pulling of the catheter.

**Female Catheterisation**

The female urethra is much shorter and without the obstacle of the prostate. Identifying the urethral orifice can sometimes be difficult. Keep the patient in the supine position with good visibility:

- Wipe the area around the urethra with sterile water. Lubricate the catheter tip with gel. Open the labia with the non-dominant hand and identify the urethral opening.
- Gently slide the catheter into the urethra.
- Push the catheter approximately 10 cm into the bladder to ensure that it is properly positioned in the bladder.

Fill a Foley catheter's balloon with the appropriate amount of water or saline. Then retract the catheter until there is a slight tug to indicate that the balloon now is in position against the bladder neck

- If the urethra is missed and the catheter is accidently placed in the vagina, leave it there as a marker until after the procedure is over and use another sterile catheter to introduce into the urethra.

**Intermittent Catheterisation**

Patients with chronic bladder dysfunction due to neurogenic or other reasons are increasingly being taught to self-catheterise at fixed times during the day to prevent incontinence. It has proven to be relatively safe.

**Risk Reduction Strategies**

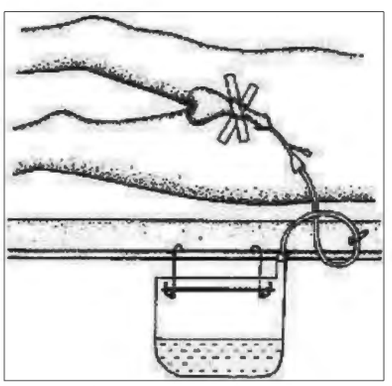
**Filling the Balloon**

Use sterile water to fill the catheter 5-cc balloon with about 10 cc of fluid for symmetrical inflation. Normal saline is not recommended. Silicone catheter balloons can lose fluid over time as fluid diffuses out into the urine; therefore, fluid levels should be checked at least every 2 weeks and fluid added as needed.

**Securing the Catheter.**

It is recommended that once connected the catheter should be secured to the thigh for women and the upper thigh or lower abdomen for men. The lower abdominal position in men decreases the potential for pressure necrosis and urethral erosion at the penile-scrotal junction.

**Figure 2: Anchoring the Urinary Catheter in a Male**



Urine sampling (refer to section on microbiological sampling).

**Catheter Irrigation**

Catheter irrigation is not recommended unless there is obstruction with clots or mucous plugs are anticipated. Breaking the catheter drainage bag connection (closed system) is a major point of bacterial entry into the system. Closed, continuous irrigation with a three-way catheter may be used for patients with repeated obstructions.

Catheter irrigations should conform to aseptic technique with sterile saline and sterile syringe used each time. Bladder instillation with anti-microbial agents should be avoided unless absolutely necessary.

**Catheter Change:** only when clinically indicated.

**Catheter Removal**

The fluid from the balloon is carefully aspirated before removal of fluid. It is recommending that the fluid be allowed to return to the syringe by gravity and not by aspiration.

**Care of the Catheter-meatal Junction**

Peri-urethral contamination may occur either at time of catheter insertion or later due to capillary action where the bacterial move up with the fluid along the catheter to the bladder. Extra-luminal migration at the catheter-meatal junction occurs more in women. It is strongly recommended washing or cleaning the perineum thoroughly with soap and water - **disinfectants are discouraged**. Meatal care after catheter insertion is not necessary. Continuous hygiene of the perineum has to be maintained. It should be noted that petroleum-based creams or ointments can degrade latex catheters and should be avoided.

**Catheter Drainage Bag and Connections**

Maintaining a closed drainage system is essential in preventing infection. When purchasing equipment, select catheter kits that have the catheter pre-connected and sealed at the catheter-drainage bag junction if possible.

**Management of Urinary Catheter Systems**

Patients and caregivers should receive instructions regarding the following points:

- Keep drainage bags off the floor below the level of the bladder
- Do not allow the outlet tube to touch the collection container or floor when emptying
- Disinfect the urine collection containers after use
- Empty the drainage bag when 1/2 to 2/3 full to avoid traction on the catheter from the weight of the drainage bag
- Empty each urine bag into an individual jug or container for each patient
- Use non sterile gloves when emptying a urinary bag
- Wipe the nozzle of the tap dry and wipe with an alcohol wipe after use

## Appendix 16: Environmental Cleaning Checklist

| | Date: | Ward: | Room no: |
|---|---|---|---|
| **No** | **Item** | | **Mark if completed** |
| 1. | Personal protective clothing depending on type of isolation (gloves, apron, goggles, mask) | | |
| 2. | Yellow bucket, yellow cloth, soap and water, disinfectant (Hypochlorite) | | |
| 3. | To make a Hypochlorite solution, mix chlorine granules in water **to obtain a concentration of 1000 ppm** – this is usually 2 sachets in 4.5L water or according to the manufacturer's instructions | | |
| 4. | Remove linen/privacy curtains around bed and place in a yellow plastic bag | | |
| 5. | Remove all waste in appropriate container (all waste regarded as medical waste) | | |
| 6. | Clean the entire room with soap and water and then disinfect with Hypochlorite solution. Pay special attention to: | | |
| | Switches & door handles | | |
| | Locker, table and chair | | |
| | Patient call bell | | |
| | Bed, rails and accessories and underneath the bed | | |
| | Mattress, both sides | | |
| | Bed wheels | | |
| | Basin and tap | | |
| | Paper towel dispenser and soap dispenser | | |
| | Waste bins | | |
| | Any other equipment, e.g., drip stand | | |
| | Walls, windows, doors, mirrors and all surfaces, e.g., windowsills | | |
| | Floor and corners | | |
| | En-suite bathroom and toilet | | |
| 7. | Remove and discard PPE and cloth in red liner carton box (medical waste) | | |
| 8. | Perform hand hygiene | | |
| 9. | Remove linen bag and waste containers | | |