Republic of Namibia

Ministry of Health and Social Services

INFECTION PREVENTION AND CONTROL GUIDELINES

3rd EDITION

2023

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FOREWORD

Healthcare-associated infections (HAIs) remain an enduring global challenge, impacting both patients and healthcare systems. In our unwavering pursuit of excellence in healthcare delivery and patient safety, the Ministry of Health and Social Services, in partnership with the World Health Organization (WHO) and our esteemed partners, proudly presents the 3rd edition of the National Infection Prevention and Control (IPC) Guidelines for Namibia.

The journey towards enhancing IPC in healthcare settings has been marked by progress and unwavering dedication. It began with the recognition of HAIs as far back as the 18th century and continues today with our profound commitment to the well-being of our patients and the efficient allocation of healthcare resources.

In this updated edition, we acknowledge that HAIs continue to pose a substantial threat to patient safety, the quality of care, and the financial stability of healthcare systems. We recognise the ever-evolving landscape of healthcare delivery, the emergence of new pathogens, and the critical importance of adapting our strategies accordingly. The revisions contained within these guidelines are informed by our collective experiences, lessons learned, and advances in medical science. The 3rd edition of the National IPC Guidelines builds upon the solid foundation established in previous editions. It reflects the latest evidence-based practices and international IPC standards, and is closely aligned with the Namibian Quality Standards for Healthcare Facilities. Additionally, it embraces innovation and technology, recognising their pivotal roles in safeguarding the well-being of both patients and healthcare workers.

Key areas emphasised in this edition include the incorporation of the WHO IPC Minimum Requirements, a thorough revision of IPC fundamental concepts, an enhanced waste management component, adding chapters on HAI surveillance, and integration of environmental considerations in IPC. Further, the topics of antimicrobial stewardship, risk management and risk reduction strategies, healthcare worker safety, the significance of IPC education and training for healthcare professionals at all levels, and the implementation of monitoring, evaluation and quality improvement measures have been included. For ease of comprehension, visual aids are introduced as the need for a multi-disciplinary approach recognises the importance of IPC as a shared responsibility among all healthcare stakeholders.

As we introduce this 3rd edition, we extend our heartfelt gratitude to all those who have contributed to its development and to the continuous improvement of IPC in Namibia. We commend the dedication and expertise of healthcare workers on the front lines, the tireless efforts of IPC focal persons, the invaluable contributions of academia, the technical expertise of laboratory professionals, and the vision of policymakers who shaped the healthcare landscape of our nation.

We fervently encourage the widespread adoption of these guidelines across all healthcare settings in Namibia. They serve as a comprehensive roadmap towards safer care, improved patient outcomes, and the judicious allocation of resources. By diligently adhering to these guidelines and working collectively, we can further alleviate the burden of HAIs and ensure the highest quality of healthcare services for all Namibians.

This 3rd edition embodies our steadfast commitment to the principles of IPC. It stands as testament to our unwavering dedication to patient safety, healthcare excellence, and the well-being of our nation. Together, we will persist on our journey towards a safer and healthier Namibia

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BEN NANGOMBE
EXECUTIVE DIRECTOR

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LIST OF ABBREVIATIONSAND ACRONYMS AND ABBREVIATIONS

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
CSU	Catheter Stream Urinestream urine
CSSD	Central Sterile Services Department
ECDC	European Centers for Disease Control and Prevention
FP	Focal point
HH	Hand hygiene
HAI	Healthcare-associated infection(s)
HAP	Hospital-acquired pneumonia
HBV	Hepatitis B Virus
HCF	Health careHealthcare facility
HCW	Healthcare waste
HH	Hand hygiene
HIC	High income countries
HIV	Human Immuno-deficiency Virus
HLD	High level disinfectant
ICU	Intensive care unit
IPC	Infection Pprevention Aand Ccontrol
IPCAF	Infection Prevention and Control Assessment Framework
IPCAT	Infection Prevention and Control Assessment Tool
IV	Intravenous
LMICs	Low to- middle-income countries
MDR	Multidrug resistant
MDV	Multidose vials
MMIS	Multimodal Improvement Strategy
MoHSS	Ministry of Health and Social Services
MR	Minimum requirement
MRSA	Methicillin resistant Staphylococcus aureus
MSDS	Material Safety Data Sheet
MSU	Midstream Urine
NIP	Namibia Institute of Pathology
OT	Operating Theatretheatre(s)
PEP	Post Exposure Prophylaxisexposure prophylaxis
PHC	Primary healthcCare
PPE	Personal protective equipment
PPM	Parts per million

PTB	Pulmonary Tuberculosis
PVC	Polyvinyl Chloride
QADQA	Quality Assurance DivisionQuality 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
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 Hhealth Oorganization

GLOSSARY OF SELECTED 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 that 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 micro-organisms that may 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 recognisable 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: Colonisation is the presence of micro-organisms 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 also 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 micro-organisms (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 hand hygiene (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 in order 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 hand rub 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 because of receiving healthcare, whether in a hospital or in an out-of-hospital setting, 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, 30-90 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 (OT), 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: Infection prevention and control (IPC) standards that should be in place at the national and facility level to provide minimum protection and safety to patients, health 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 multi-disciplinary 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

(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 micro-organisms 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 micro-organisms that may infect the patient to be kept away from the patient, an example of its use is in OTs.

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 (9 Dec 2016 Regulations relating to medical devices and IVDs).

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: INTRODUCTION

1.1 Background

The burden of infectious diseases is a global public health concern, and infection prevention and control (IPC) strategies are critical to address this burden. The World Health Organization (WHO) estimates that healthcare-associated infections (HAIs) annually affect hundreds of millions of people globally, with an estimated 7-10% of patients in high-income countries (HIC) and 25% in low to middle-income countries (LMICs) acquiring at least one HAI while in hospital.[1]

HAI rates are often higher in LMICs due to several factors, including inadequate resources, poor infrastructure, and a need for well-trained IPC practitioners. Poor leadership and supervision also negatively impact the implementation of IPC programmes[2] The pooled point-prevalence of HAIs in Africa is about twice as high compared to reported rates in developed countries. Rates are higher in ICU and neonatal wards compared to other wards. Surgical site infections and bloodstream infections are the most common HAIs reported in Africa, with recent hospitalisations, the presence of peripheral vascular catheters and diabetes mellitus identified as the most substantial risk factors associated with HAIs in Africa. Gram-negative bacteria were the primary causative pathogens associated with HAIs. IPC measures and antimicrobial stewardship are recommended to reduce the burden of HAIs among hospitalised patients in Africa.[3]

Although limited data exists about the burden of HAIs in Namibia, a study conducted in a tertiary hospital in Windhoek found that the prevalence of HAIs was 9.3%, with the highest rates observed in the ICU and surgical wards.[4] This data is similar to other published studies from Africa. A 2018 survey conducted in Namibia found that while many healthcare facilities had IPC policies and procedures in place, there were gaps in implementing and monitoring these policies, with only 64% of facilities reported as having a designated IPC focal person.

The Namibian healthcare system consists of public and private health facilities, with the public sector being the primary provider of healthcare services. There are significant disparities in access to healthcare services, especially in rural areas, where healthcare services and resources are limited.[5]

Despite some challenges, Namibia has a functional national IPC programme. In July 2022, the WHO IPC Core Components Assessment Tool (IPCAT) was used to assess the Namibian IPC programme at the national level. Namibia was one of 18 African countries that obtained the highest score in the assessment. The findings from the assessment provided the foundational framework that led to the development of the Namibia IPC Action Plan. The Action plan is aligned with the priorities set out in the WHO Global Report on IPC [6] as well as the recently published Global Strategy on IPC.[7]

Since 2004, the MoHSS has developed and implemented several initiatives and interventions to strengthen the healthcare system. The MoHSS developed Hospital Quality standards with annual assessments that are highlighting areas for improvement.[8]

The National Action Plan for IPC 2023/4-2026/2027 will further strengthen the IPC programme. The revision of the IPC Guideline, the Central Sterile Services Guideline and the Operating Theatre Guideline will further assist with implementing the National Action Plan. At the same time, the standardised training curricula will further capacitate IPC practitioners and other healthcare workers with the necessary knowledge and skills to implement and strengthen the national IPC programme.

[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. https://joppp.biomedcentral.com/articles/10.1186/s40545-022-00500-5

[4] MoHSS National Action Plan for Infection Prevention and Control 2023 – 2027. May 2023.

[5] MoHSS National Action Plan for Infection Prevention and Control 2023 – 2027. May 2023.

[6] WHO Global report on infection prevention and control. 2022. Available: https://www.who.int/publications/i/item/9789240051164

[7] 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

[8] MoHSS National Action Plan for Infection Prevention and Control 2023 – 2027. May 2023.

1.2 Rationale for the IPC guideline

The revision of the Namibian IPC Guideline, based on the latest scientific evidence and technological advances, is important to support the implementation of the National Action Plan for IPC (2023-2027)[9] and ensure adherence to the Namibian Hospital Quality Standards.[10] The priorities detailed in the National Action Plan are aligned with the recently published WHO Global Strategy for IPC.[11]

The regular revision of IPC guidelines is detailed in Core Component 2 of the WHO Core Components of IPC programmes at a national and acute health care facility level and should be done every 3-5 years.[12] Using the WHO Minimum Requirements[13] and a multimodal improvement strategy[14] will further assist with implementing and adopting the revised guidelines.

The revision process took into account the practical experience and implementation challenges of various stakeholders across healthcare delivery in Namibia. The lessons learned from recent pandemics and outbreaks were also considered.

The updated IPC guidelines will align with the goals and recommendations of Namibia's health sector plans, ensuring synergy between IPC strategies and the broader healthcare objectives of the country. By integrating the guidelines into the national healthcare framework, their implementation and impact will be more effectively monitored and evaluated.

1.3 Aim and Purpose of the guideline

1.3.1 Aim

The guideline aims to assist healthcare workers in improving the quality and safety of the care they provide; these guidelines aim to promote and facilitate the overall goal of IPC by providing evidence-based recommendations on the critical aspects of IPC, focusing on the fundamental principles and priority action areas of IPC. All health service organisations should consider the risk of HAI and antimicrobial resistance (AMR) transmission in order to implement these recommendations based on their specific context and circumstances.

The IPC Guideline further aims to set national standards for the prevention and control of HAIs and to ensure compliance to the National Quality Standards.

1.3.2 Purpose of the guideline

The purpose of the guideline is to:

- Support and improve prevention and adequate management of HAIs in HCFs
- Prevent and reduce environmental health hazards associated with transmission and colonisation of pathogens (including multidrug-resistant organisms) in patients, health care providers and visitors in HCF
- Optimise IPC programmes and resources in HCFs
- Improve IPC surveillance and prevent outbreaks
- Provide a reference document to develop harmonised training programmes aligned with national guidelines and recommendations

[9]MoHSS National Action Plan for Infection Prevention and Control 2023 – 2027. May 2023.

[10]Namibia Hospital Quality Standards. 2021

[11]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

[12]WHO. Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. 2016. Available: https://www.who.int/publications/i/item/9789241549929

[13]WHO. Minimum requirements for infection prevention and control programmes. 2019. https://www.who.int/publications/i/item/978924151694514

[14]WHO. Multimodal Improvement Strategy. Available: https://www.who.int/publications/m/item/who-multimodal-improvement-strategy

1.4 General guideline statements

The IPC guideline provides evidence-based recommendations and protocols for healthcare professionals, administrators, and other stakeholders to effectively identify, prevent, and manage infectious diseases and multidrug-resistant organisms. The guideline emphasizes the importance of adherence to standard precautions and transmission-based precautions to prevent transmission of infections and antimicrobial-resistant pathogens. Additionally, it highlights the significance of surveillance, early detection, and appropriate management of infectious diseases to minimise their impact on public health. The guideline also promotes education and training to ensure the competency of healthcare personnel and the empowerment of individuals and communities in IPC practices.

1.5 Target audience

The IPC guideline is for use by all working in healthcare settings, both public and private. This includes healthcare workers, management, and support staff. The guideline is further aimed at policymakers at the national, provincial and facility levels who must guide and support the implementation of the National IPC Action Plan.

Most importantly, the guideline aims to guide healthcare workers at the facility level to adhere to IPC principles and implement the IPC National Action Plan to protect themselves and their patients. This manual will be used as a basis for training of health workers.

1.6 Regulatory and policy framework

The National IPC Guideline should be read with the National Action Plan for IPC 2023/4-2026/7 to support an IPC programme at the national and healthcare facility level to reduce HAI and antimicrobial resistance (AMR). This guideline is aligned with the minimum requirements of the WHO Core Components of IPC programme recommendations. It highlights the essentials for developing and improving IPC at the national and healthcare facility level in a systematic, stepwise manner for Namibia. It further supports the Namibian Antimicrobial Resistance National Action Plan (May 2017). ***The guideline is aligned with the following Namibian guidelines, policies and legislation:***

- Operating Theatre Manual (2023)
- CSSD Manual (2023)
- Water Sanitation and Hygiene (WASH) in Healthcare Facilities: assessment in selected hospitals across the regions in Namibia (2022)
- Namibian Pollution Control and Waste Management Policy (2003)
- Namibian Hospital Quality Standards (2021)
- Namibian Primary Healthcare Facility Quality Standards (2021)
- Namibia National Technical Guidelines for Integrated Disease Surveillance and Response 3rd Edition, Part 1 (2023)
- Namibia National Technical Guidelines for Integrated Disease Surveillance and Response 3rd Edition, Part 2 (2023)
- Public and Environmental Health Act (2015)
- Occupational Health and Safety Act (2003)
- Namibia Standard Treatment Guidelines (2021)
- National Guidelines on Post-Exposure-Prophylaxis for HIV, HBV and Tetanus after workplace exposure and sexual assault (2011)
- COVID-19 IPC SOP (Version 2)
- Phlebotomy, Blood Donation and Parenteral Therapy Guidelines (2015)

- Operation Theatre Guideline (2023)
- Central Sterile Service Department Guidelines (2023)

1.7 Structure of the guideline

The guideline is based on the following fundamental principles:

- Understanding standard and specific precautions
- Understanding the modes of transmission of infectious agents and risk management
- Adherence to recommended effective care practices that minimise the risk of transmission of infectious agents
- Availability of governance structures that support the implementation, monitoring, and reporting of IPC during care practices
- Compliance with national IPC regulations and standards

1.8 Coordination structure for IPC at all levels in the country

The IPC structure for Namibia is outlined below. Within the MoHSS hierarchy, multiple tiers of structures oversee IPC, with the QAD assuming responsibility for its implementation.

1.8.1 National level

The execution of the IPC programme falls under the responsibility of the National IPC Practitioner within the QAD. This responsibility is vested at Control Health Programme Administrator level, as illustrated in Figure 1.

1.8.2 Control Health Program Administrator for IPC

Role overview:

The IPC Control Health Programme Administrator (National IPC Practitioner) is pivotal in overseeing and advancing infection prevention and control (IPC) initiatives within the healthcare sector. Reporting directly to the head of the QAD, this position is responsible for strategically implementing the National IPC Action Plan and promoting best IPC practices throughout healthcare facilities at all levels. The role involves leadership, coordination, capacity building, and close collaboration with various stakeholders to ensure the highest patient care and safety standards.

Responsibilities:

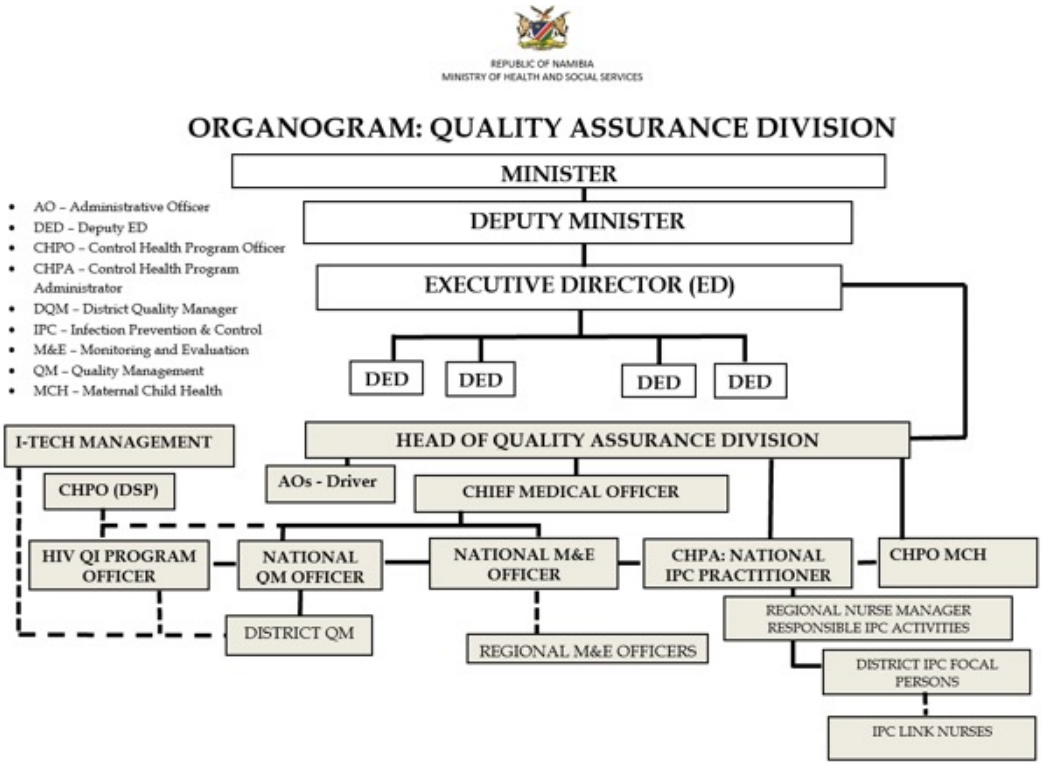
Reporting Structure: Reports directly to the Head of QAD.

1. ***National IPC Focal Point:*** Acts as the central point of contact for IPC activities at the national level, facilitating communication and collaboration between various healthcare entities.
2. ***Strategic implementation:*** Ensures the effective execution of the National IPC Action Plan, working closely with healthcare facilities to guarantee consistent adherence to recommended IPC protocols.
3. ***Guidance and compliance:*** Monitors and oversees the implementation of recommended IPC activities across all levels of healthcare delivery, fostering a culture of compliance with established guidelines.
4. ***Capacity building and supervision:*** Develops and facilitates training programmes to enhance healthcare professionals' understanding and application of IPC practices. Conducts supervision to ensure proper implementation and provides guidance for improvement.

5. ***Monitoring and evaluation (M&E):*** Develops robust M&E mechanisms to assess the effectiveness of IPC practices. Regularly evaluates healthcare facilities' compliance and performance and provides actionable insights for continuous improvement.
6. ***Performance indicators:*** Collaborates in developing national performance indicators related to IPC. Assists in creating measurable benchmarks that reflect the impact of IPC initiatives on patient safety and overall healthcare quality.
7. ***Reporting and analysis:*** Analyses monthly and quarterly reports related to IPC activities. Compiles insights and findings to provide comprehensive reports to the supervisor, highlighting achievements, challenges, and recommendations.
8. ***Quality assurance:*** Contributes to monitoring and maintaining the quality of nursing care and medical practices in both public and private healthcare facilities. Ensures that IPC protocols are integrated into overall quality assurance efforts.
9. ***Policy development:*** Participates in the identification and development of policies and guidelines pertaining to IPC and general patient care. Offers expertise to help shape comprehensive healthcare policies that prioritise infection prevention and control.
10. ***National IPC Steering Committee:*** Serves as the secretariat for the National IPC Steering Committee, supporting its activities and ensuring effective communication among committee members.

Figure 1: Structure for quality assurance – National level

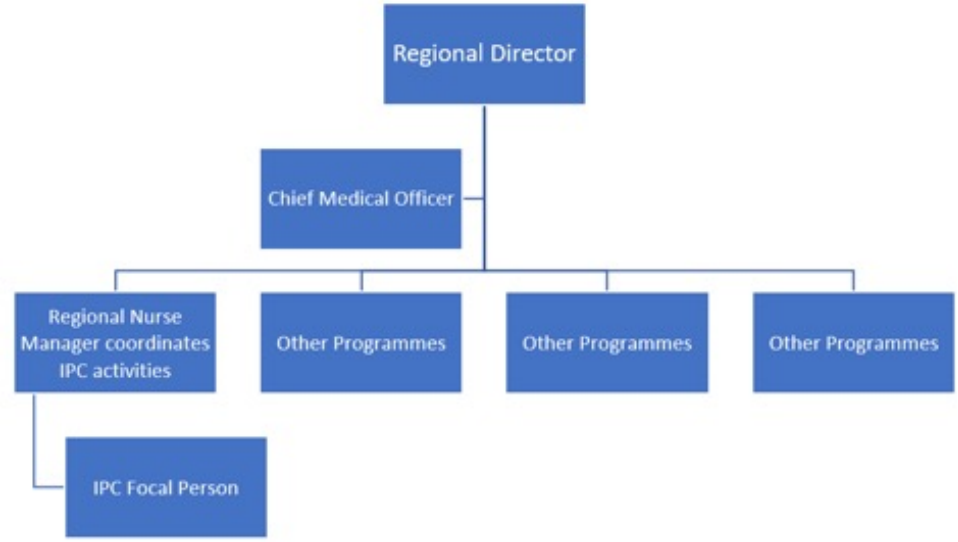
FIGURE 1: STRUCTURE FOR QUALITY ASSURANCE – NATIONAL LEVEL



1.8.3 Regional Levellevel

The key person should be the healthcare worker in charge of risk assessment, and management and quality assurance ***(Figure 2).***

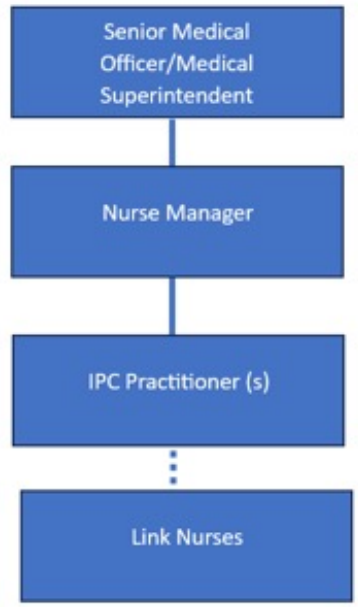
FIGURE 2: REGIONAL LEVEL IPC STRUCTURE WITH RISK ASSESSMENTRISK ASSESSMENT AND QA



1.8.4 District and Hospital Levelhospital level

Figure 3 explains the reporting structures at the district and hospital levels, with the IPC practitioner reporting to the Nurse Manager and IPC links nurses hashaving a functional reporting line to the IPC practitioner(s).

FIGURE 3: ORGANOGRAM AT THE DISTRICT LEVEL - THE SENIOR MEDICAL OFFICER IS ULTIMATELY RESPONSIBLE FOR IPC



1.9 Role and responsibilities of Hhealthcare Wworkers

The responsibility for IPC lies with the Chief Executive Officer of a healthcare facility who is accountable to top government management or top management level if in the private sector. This duty may be delegated to the IPC Team or designated person.

It is the responsibility of each healthcare provider to deliver care that is not harmful to him or herself, other healthcare providers, patients, and the environment.[15]

[15]Mehtar, S. 2010. Understanding Infection Prevention and Control. Juta & Company. Claremont. South Africa

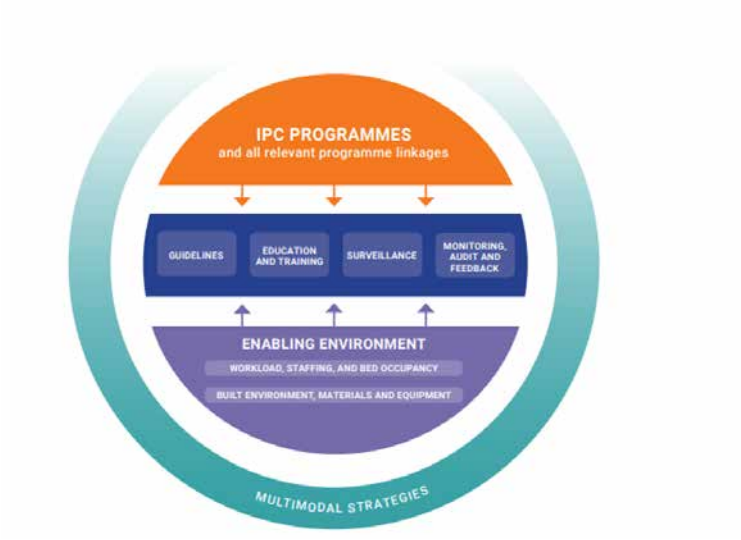
CHAPTER 2: IPC MINIMUM RREQUIREMENTS

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 the national and facility level to provide minimum protection and safety to patients, health workers and visitors, and is based on the WHO core components for IPC programmes.[16]

The WHO 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

FIGURE 4: VISUAL REPRESENTATION OF THE WHO CORE COMPONENTS FOR IPC PROGRAMMES[17]



The Minimum Requirements represent the starting point to build a strong and effective IPC programme at national and facility level (Figure 4) 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[18]

Each of the elements of the core components will be discussed in detail in different chapters in the guideline.

2.1 IPC programme

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

[16]World Health Organization. 2019. Minimum Requirements for infection prevention and control programmes. Geneva: World Health Organisation. Available at: https://www.who.int/publications/i/item/9789241516945
[17]World Health Organization. 2019. Minimum Requirements for infection prevention and control programmes. Geneva: World Health Organisation. Available at: https://www.who.int/publications/i/item/9789241516945
[18]World Health Organization. 2019. Minimum Requirements for infection prevention and control programmes. Geneva: World Health Organisation. Available at: https://www.who.int/publications/i/item/9789241516945

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 Namibian government has developed, implemented, and reinforced a nationwide training programme in IPC and developed an IPC guideline, Operating Theatre Guideline and Central Sterilizing Services guideline that support the implementation of an IPC programme across facilities and disciplines. The government is committed to implement, continuously review, and update these guidelines. There is however a need for financial and adequately trained human resources. The implementation of the IPC programme is supported by the National Action Plan for IPC 2023/4-2026/2027.[19]

2.2.1 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.

2.2.2 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 district hospital or for every 200-250 acute beds per facility (see Appendix 1 on 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 at health centre and clinic level who works closely with the District IPC practitioner/focal person. The district focal person should be adequately trained to ensure the provision of adequate technical support. Each healthcare facility should have IPC link nurses with a functional reporting line to the IPC practitioner. Link nurses 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. See paragraph 2.2.5.1 for the functions of the IPC Committee.

2.2.3 Management Ssupport

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.

2.2.4 IPC budget

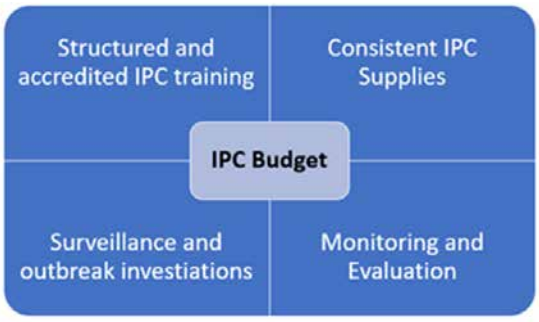
A dedicated IPC budget should be made available for:

- 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.

[19]Namibia National Action Plan for IPC 2023/4 – 2026/2027.

- Investigate outbreaks and clusters of infections in healthcare.
- Monitoring and Evaluationevaluation(M&E).)

FIGURE 5: ELEMENTS OF AN IPC BUDGET



2.2.5 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 Medical Superintendent (at national and intermediate hospitals)
- Senior Medical Officer (at district 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
- Nurse managers/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

2.2.5.1 Functions of the IPC Committee

There must be monthly to quarterly 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 M&E teams to inspect if required. The matters which are addressed by the IPC Committee are widespread, but essentially the following are included **(Figure 6):**

- Surveillance
- Outbreak investigation and reporting
- Risk management
- uality Improvement
- Education and training of healthcare workers

- M&E (including audits)
- Recording and analysis
- Antimicrobial stewardship - most facilities have an additional Antimicrobial Stewardship Committee.

The roles and responsibilities of the IPC Committee is detailed in **Appendix 17**

FIGURE 6: FUNCTIONS OF THE IPC COMMITTEE

CHAPTER 3: INFECTION PREVENTION AND CONTROL - BASIC CONCEPTS

Infection Prevention and Control (IPC) is a process of developing and implementing safe, evidence-based practices towards improving quality healthcare. IPC covers a wide spectrum from procurement to quality of patient care. IPC programmes should be proactive with processes and structures in place that reduce the risk of acquiring an infection in healthcare facilities.[20] All health workers should understand the basic principles of transmission of micro-organisms and how to prevent the spread thereof. This chapter will focus on the transmission of micro-organisms and the factors contributing to the transmission.

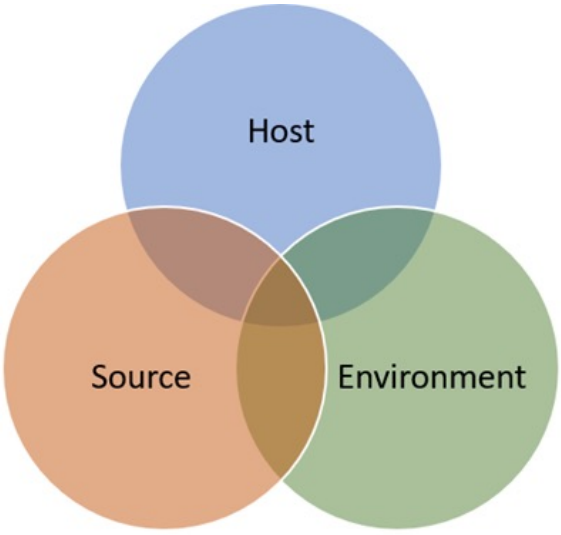
3.1 Epidemiology of infectious diseases

Epidemiology plays a vital role in IPC by providing valuable insights into the patterns, causes, and distribution of infectious diseases. Epidemiology can provide important information about the occurrence and transmission of infections, assist with the identification of risk factors, identify, and monitor outbreaks and design effective strategies to mitigate the transmission of infections. By analysing data and understanding the dynamics of infections, healthcare professionals can implement evidence-based measures to prevent and manage HAIs in healthcare facilities and the community. Using epidemiological principles and making decisions based on data empowers healthcare systems to respond proactively to potential threats, improve patient safety, and safeguard public health.

3.2 Transmission of Micromicro-organisms

For any infection to develop the following three elements are needed as demonstrated in **Figure 7.**

FIGURE 7: ELEMENTS CONTRIBUTING TO AN INFECTION



The characteristics and virulence of the pathogen, the infective dose and the route of transmission also plays an important role in the development of an infection. **Table 1** provides an overview of the factors contributing to an infection.

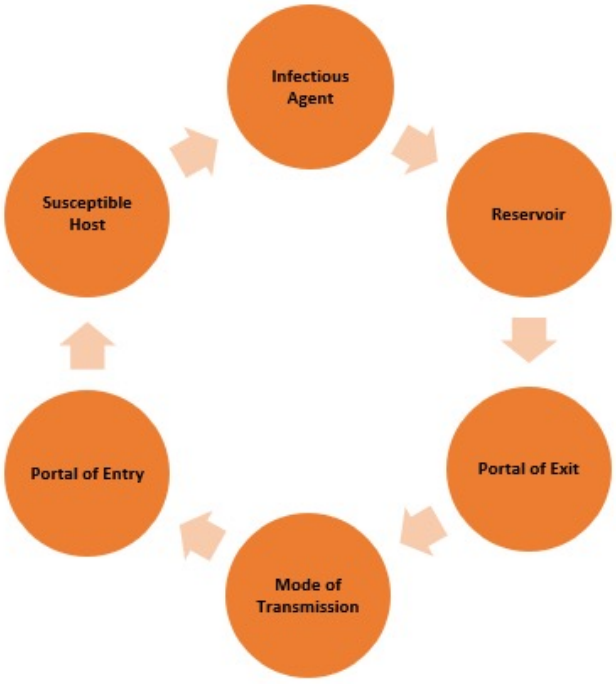
[20]Mehtar. S., Understanding Infection Prevention and Control. Juta & Company. Claremont. South Africa

Table 1: Factors contributing to an infection

1.Source	• Colonised or infected patients • Health workers (specifically hands) • Visitors (rarely) • Contaminated environment • Direct spread to other patients
2. Susceptible Hosthost	• Breaks in normal defence mechanisms (skin, mucous membrane) • Patients with invasive devices • Age • Underlying disease • Corticosteroids • Other immunosuppressive agents • Irradiation
3. Environment	The ideal conditions under which infections can spread.
ROUTES OF TRANSMISSION	

The sequence of infection transmission is also called the 'chain of infection'. It is the way a micro-organism can be transmitted to a susceptible host. For an infection to be transmitted, all the elements must be linked.
Figure 8 demonstrates the steps required for the transmission of an infectious agent or micro-organism:

FIGURE 8: CHAIN OF INFECTION



Interrupting one of the links will prevent further spread of an infection

Chain of transmission of infection:

1. **Infectious agent:** A virus, bacteria, etc.
2. **Reservoir:** The environment where the micro-organism is found, e.g., Staphylococcus aureus is commonly found in the nose; *Mycobacterium tuberculosis* (TB) is commonly found in the lungs.

3. **Portal of exit:** *TB bacilli* are coughed up from the lungs (respiratory tract) into the air.
4. **Route of transmission:** Contact, droplet or airborne, e.g., TB remains suspended in the air as aerosols containing *TB bacilli.*
5. **Portal of entry:** *TB bacilli* suspended in the air may be breathed into the lungs of a person in the same room as the patient with TB
6. **Susceptible host:** A person who might be immune compromised or has other risk factors for infection.[21]

To control HAIs, the chain of infection must be broken. This can be done by:

- **Removing the reservoir or pathogen:**
  - ⇨ Isolating the infected patient
  - ⇨ Treat the infection
  - ⇨ Cleaning the environment
- **Interrupt the mode of transmission:.**
  - ⇨ Hand hygiene
  - ⇨ Decontamination of medical devices
  - ⇨ Personal protective equipment
  - ⇨ Cough etiquette
- **Prevent acquisition by a new host:.**
  - ⇨ Isolation
  - ⇨ Prophylaxis
  - ⇨ Vaccination
  - ⇨ Personal protective equipment

3.3 Routes of Ttransmission

Transmission of micro-organisms can occur through several routes and the same organism may be transmitted by more than one route **(Table 2).** There are five main routes of transmission.

Table 2: Routes of transmission of micro-organisms

Main Routes	Type of Transmission	Examples
Contact	Direct e.g., hands	Staphylococcus aureus
	Indirect: Fomites and the environment e.g., equipment	*Acinetobacter baumannii*, Methicillin resistant *Staphylococcus aureus*
	Sexual	Sexual transmission of HIV or syphilis
Respiratory	Droplet	Pertussis, *Neisseria meningitidis*
	Airborne (aerosols)	Tuberculosis, Measles,
Ingestion	Water	Cholera (contaminated water)
	Food	Salmonella (contaminated food)
	Faecal matter (faeco-oral)	Hepatitis A, Hepatitis E
Inoculation	Injection, trauma, surgery, blood product	Needlestick injury transmitting HIV, Hepatitis B & C
	Insects &and vectors	Mosquitoes transmitting malaria
Trans-placental	Mother-to-child	HIV, syphilis, rubella[22]

[21] 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
[22] Dramowski, A., Wood, D., Mehtar, S., Bettercare. Infection Prevention and Control. https://bettercare.co.za/infection-prevention-and-control/index.html

There are two main ways in which micro-organisms are acquired and can cause disease:

- **Exogenous acquisition:** micro-organisms acquired from external sources (outside the body)
- **Endogenous acquisition:** micro-organisms acquired from the host's own of micro-organisms or normal flora[23]

It is important to know how an infection was acquired to prevent its spread to other susceptible people (hosts)

3.4 Difference between colonisation and infection

To manage infections and the appropriate use of antimicrobial agents, the difference between colonisation and infection should be established. The presence of a microbe on a laboratory result does not mean clinical disease. Infection is usually accompanied by clinical signs and symptoms (infection); however, colonisation has the potential to cause clinical disease. Clinical staff should learn to differentiate between the following, because it affects the outcome of the patient's management, as well as contributing to antimicrobial resistance.

Colonisation: Presence of micro-organisms with the potential to multiply without causing an infection in the host such as Coagulase negative staphylococcus on the skin or Methicillin resistant staphylococcus aureus (MRSA) colonisation in nasopharyngeal mucosa.

Infection: The presence of a microbe in the presence of clinical disease and may require antimicrobial therapy.

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 recognisable disease (convalescent carrier). Under either circumstance the carrier state may be of short or long duration (temporary or transient carrier, or chronic carrier).[24]

[23]Dramowski, A., Wood, D., Mehtar, S., Bettercare. Infection Prevention and Control. https://bettercare.co.za/infection-prevention-and-control/index.html
[24]https://www.ph.ucla.edu/epi/bioter/anthapha_def_a.html

CHAPTER 4: STANDARD PRECAUTIONS

In healthcare delivery the implementation of IPC practices is essential to reduce and prevent transmission of micro-organisms. This section describes simple yet effective interventions to prevent transmission.

Standard precautions (SPs) are aimed at reducing the risk of transmission of micro-organisms including bloodborne pathogens, from recognised and unrecognised sources. Patients and staff may serve as reservoirs for micro-organisms, even if only colonised and not exhibiting any signs of infection.[25,26] SPs are the basic level of infection prevention measures which apply to all health workers and patients all the time.

Standard Precautions

The goal is to reduce the risk of transmission of microbes from both recognised and unrecognised sources of infection and SP should become second nature as part of healthcare practice.

The main components of SPs are listed hereunder and illustrated in **Figure 9:**

1. Hand hygiene
2. Appropriate use of personal protective equipment
3. Injection safety and occupational health;[27]
4. Environmental cleaning
5. Healthcare waste management
6. Safe handling of linen and laundry
7. Decontamination of medical devices
8. Respiratory hygiene and cough etiquette
9. Patient placement
10. Principles of asepsis
11. Appropriate use of antiseptics, disinfectants, and detergents

SPs must be applied to all patients all the time

FIGURE 9: MAIN COMPONENTS OF SPS

The different SPs are discussed in more detail in the following section.

[25]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
[26]CDC Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings, 2007. http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf
[27]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/

4.1 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 HH is a critical component of SP and ensures patient and staff safety.[28] it is the simplest, and most cost-effective measure to reduce HAIs. [29,30]

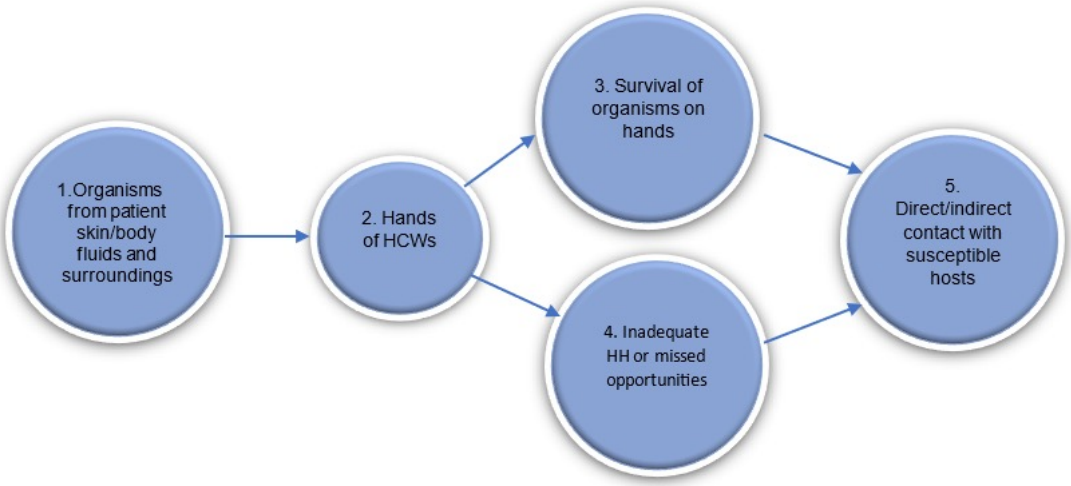
Commitment and support from management at all levels are critical in the successful and sustainable implementation of HH strategies. The implementation of multimodal implementation strategies is the most effective approach to improve HH compliance.[31,32]

4.1.1 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 10):***

- Organisms are present on the patient's skin or in blood and body fluids
- Have been transferred onto the hands of the health workers
- Remain viable on the hands of the health workers
- Missed opportunities for HH and inadequate HH can lead to contaminated hands of the caregiver coming into direct contact with another patient or with an inanimate object that will indirectly come into contact with the patient.[33]

FIGURE10: TRANSMISSION OF ORGANISMS VIA HANDS [34]



4.1.2 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.[35]

Resident flora live in the deeper skin layers (dermis) and is part of normal flora. It is also more difficult to remove.[36] They are less likely to cause infection.[37]

[28]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.
[29]Boyce JM, Pittet D. Guideline for Hand Hygiene in Health Care Settings. Infect Dis Clin Pract. 2002;11(5):306–11
[30]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.
[31]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
[32]WHO. Technical reference Manual.2009. Available: https://apps.who.int/iris/bitstream/handle/10665/44196/9789241598606_eng.pdf?sequence=1&isAllowed=y core-components/en/
[33]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.
[34]SA NDoH. 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
[35]National Institute for Health and Clinical Excellence. Infection prevention and control of healthcare-associated infections in primary and community care. 2012.
[36]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
[37]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.

4.1.3 Barriers to hand hygiene

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

- HH agents that cause skin irritation and dryness
- Perception that patient activities take priority over HH, especially with heavy workload and understaffing
- Lack of resources (water, soap, and paper towel)
- Infrastructure limitations - hand wash basins inconveniently located and/or unavailable
- Alcohol-based hand rub (ABHR) not available at point of care
- Unavailability and/or inadequate knowledge of guidelines, protocols, or techniques for HH
- Lack of positive role models and social norms
- Lack of recognition of risk of cross-transmission of pathogens
- Simple forgetfulness and lack of attention to detail (washing hands - but not adequately). [38,39,40]

NEVER wash hands and immediately apply ABHR to wet hands as this may damage the skin. It is not recommended that hands are routinely washed with an antimicrobial soap.

4.1.4 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.[41] When contaminated, gloves can also transmit pathogens between patients or the environment and patients.[42]
- HH must be performed before and after using 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 substituted for poor hand hygiene!

4.1.5 Dermatitis

Health workers with contact dermatitis may remain colonised with potentially pathogenic micro-organisms for prolonged periods of time.[43] 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 [44]

[38]World Health Organization (WHO). WHO Guidelines on Hand Hygiene in Health Care [Internet]. 2009. Available from: http://www. who.int/infection-prevention/publications/hand-hygiene-2009/en/
[39]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
[40]SA NDoH. 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
[41]Gessler A, Stärk A, Sigwarth V, Moirandat,C.How risky are pinholes in gloves? A rational appeal for the integrity of gloves for isolators. PDA J Pharm Sci Technol. 2011 May-Jun;65(3):227-41. doi: 10.5731/pdajpst.2011.00716
[42]WHO Guidelines on hand hygiene in healthcare.2009.Available: https://www.who.int/publications/i/item/9789241597906
[43]Al J de V et. Outbreak of Serratia marcescens colonisation and infection traced to a healthcare worker with long-term carriage in the hand. Infect Control Hosp Epidemiol. 2006; 27:1153–8
[44]SA NDoH. 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

4.1.6 Recommendations for protecting the 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

4.1.7 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, in the nail bed, and cuticle
- **No acrylic nails, artificial nails, or nail enhancements to be worn**

Jewellery:

- The wearing of rings or other jewellery when delivering healthcare 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[45]

4.1.8 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.

4.1.8.1 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 3** provides an overview of the infrastructure requirements for hand washing.

[45]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

Table 3: 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** • One hand washbasin for every six beds • Dedicated to hand washing only • Do not have any plugs to prevent soaking of medical devices • Deep enough bowl deep to prevent splashing and contamination of clothes • No overflow outlet • No recesses for water to collect • Waterproof splashback and properly sealed [46]
Taps	• Elbow operated mixer taps • Taps should not be aligned to run directly into the drainage aperture to prevent splashback[47]
Water	• Clean, free running and at a comfortable temperature
Liquid soap	• Available at each basin • Provided in a closed container that is either manually or elbow-operated with a pump action or an automated dispenser • Closed containers must have single use disposable sachets • Must have a surfactant to allow good lather • Hypo-allergenic and well tolerated • Never topped up[48]
Paper Towel dispensers	• Wall mounted close to the hand wash basin and soap dispensers • No-touch paper roll dispenser for automatic dispensing is preferred, but single use pull-out paper towels are also acceptable • If single use pull-out paper towels are used, load the dispenser correctly to prevent contamination • Paper should have adequate strength to withstand contact with wet hands • **Warm air hand dryers are not recommended for health facilities**[49,50]
Bins	• Pedal operated to prevent contamination of hands. • Emptied regularly (at least three times a day and twice during the night) • Do not discard any biohazardous material in bins

4.1.8.2 Bottles for liquid soap

- Liquid soap must be supplied in disposable 500ml pump top bottles
- Bottles should never be topped up, neither should liquid soap be decanted
- However, if facilities are still using containers that must 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

[46] Mehtar. S., 2010. Understanding Infection Prevention and Control. Juta & Company. Claremont. South Africa
[47] Mehtar. S., 2010. Understanding Infection Prevention and Control. Juta & Company. Claremont. South Africa
[48] SA NDoH. 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
[49] World Health Organization (WHO). WHO Guidelines on Hand Hygiene in Health Care. 2009. Available from: http://www. who.int/infection-prevention/publications/hand-hygiene-2009/en/
[50] AM Snelling, T. Saville, D. Stevens and C.B. Beggs. Comparative evaluation of the hygienic efficacy of and ultra-rapid hand dryer vs conventional warm air hand dryers. Journal of Applied Microbiology 110, 19–26. 2010

- Always write the date on a container when it is first used/opened [51]

See **Appendix 1** 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

4.1.8.3 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 when it was first opened or placed in the dispenser on the bottle to assist with monitoring consumption
- Sturdy disposable bottles (up to 500ml) with pump-action tops are recommended
- Long-nose pump action tops are recommended to avoid splashing **(Figure 11)**
- ***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
  - Does not allow application of the fingertips first method
  - 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 at the health facility
- Have adjustable clamps to fit onto over-bed tables or brackets to fit onto walls, trolleys, or other fixed surfaces in the patient zone (**Figure 11**)
- If a lever arm is necessary, the length of the lever arm must not obstruct workflow

[51] SA NDoH. 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

FIGURE 11: BRACKETS FOR ABHR

Different types of ABHR dispensers are described in **Table 4.**

Table 4: Types of ABHR dispensers

Type of dispenser	Advantages	Disadvantages
Automated dispensers	• Aesthetically pleasing • Fast • Non-touch • Closed system that minimises contamination of the content	• Unusable when replacement batteries are required • Pre-set amount of product • Costs of maintenance and batteries • Requires regular monitoring
Manual Dispensers	• Not dependent on batteries • Wall or work surface mounted • Closed system that minimises contamination of the content • Robust to use [52]	• Can be contaminated if incorrect technique is used

Dispenser must be placed at the point of care – within easy access to HCWs

Amount of ABHR required per HH action

Size of hands differsdiffer 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 2-3ml (depending on hand size).[53] Alternatively enough ABHR should be used to rub hands for 20 seconds.

Small ABHR containers for personal use

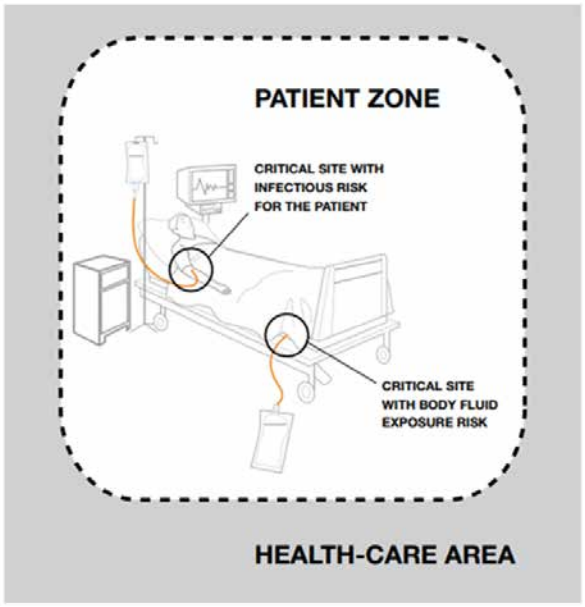
Small pockets size containers filled with ABHR may be carried by health workers. This is acceptable practice since the hands will be disinfected prior to touching patients.[54]

4.1.9 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 (Five moments of hand hygiene). Hand hygiene (HH) should be performed when entering or leaving the patient zone[55] **(Figure 12)** and after any activity that may contaminate the hands and transfer microbes to the patient.

[52]SA NDoH. 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
[53]SA NDoH. 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
[54] WHO Guidelines on hand hygiene in healthcare.2009.Available: https://www.who.int/publications/i/item/9789241597906
[55]WHO. Hand Hygiene Technical Reference Manual. 2009. https://apps.who.int/iris/bitstream/handle/10665/44196/9789241598606_eng.pdf?sequence=1&isAllowed=y

FIGURE 12: 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 of hand hygiene"** for when HH should be performed by health workers, and care givers of patients admitted to HCFs are illustrated in **Figure 13**. These five moments are applicable to both inpatient and outpatient settings. **Training should focus not only on technique, but also on the practical implementation of the five moments of HH.**

FIGURE 13: FIVE MOMENTS OF HAND HYGIENE [56]

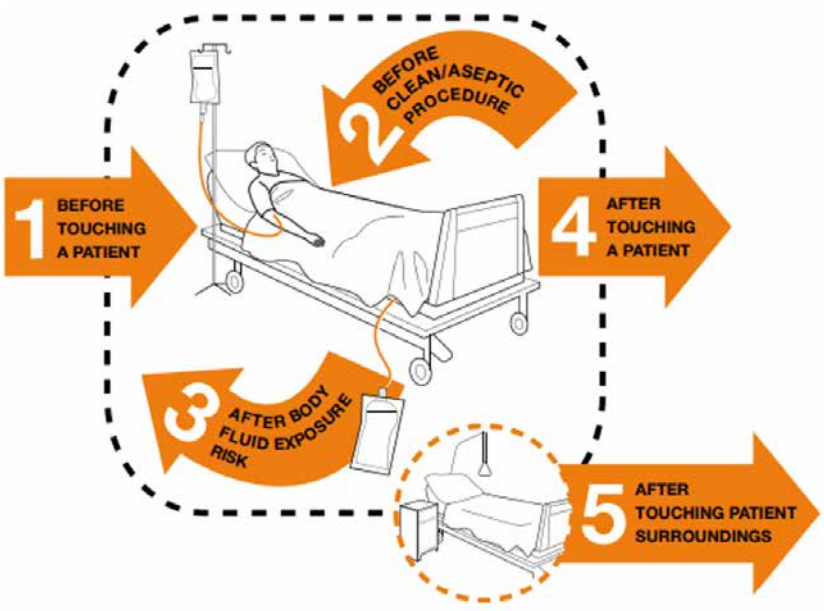


Table 5 provides an explanation of the different moments of hand hygiene and the indications for each.

[56] WHO. Hand Hygiene Technical Reference Manual. 2009. https://apps.who.int/iris/bitstream/handle/10665/44196/9789241598606_eng.pdf?sequence=1&isAllowhand d=y

Table 5: Indications for the five moments of hand hygiene

Five 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 - 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. - If moving from a contaminated body site to another body site during care of the same patient. - After removing sterile or non-sterile gloves.
Moment 4	**After touching the patient**	-Before and after touching the patient - 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 - After removing sterile gloves or non-sterile gloves[57]

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 performedApplication of the 5 Momentsfive moments of Hand Hygienehand hygiene

4.1.10 Application of the five 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 Twotwo: 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 micro-organisms from a colonised site to a clean site on the patient

[57]WHO. Hand Hygiene Technical Reference Manual. 2009. https://apps.who.int/iris/bitstream/handle/10665/44196/9789241598606_eng.pdf?sequence=1&isAllowed=y

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 micro-organisms can be transmitted to the next patient/surface the health worker touches. This includes after carrying out environmental cleaning[58]

4.1.11 Types of hand hygiene methods

Table 6 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 **Appendices 2-4.**

It is important to ensure the following before any 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[59]

[58]SA NDoH. 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
[59]SA NDoH. 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

Table 6: Summary of hand hygiene methods

Method	Aim	Products	Main Indicatorsindicators
Hand hygiene using **Alcohol hand rub**	Destroy transient microbes	ABHR	• Before patient contact • Before clean or aseptic technique • After contact with the patient • After contact with the environment • Before wearing gloves • After removing gloves - if hands are not visibly soiled
HH using **Soap and water** Hygienic hand wash	Remove transient microbes	Wash with plain liquid soap and water and dry thoroughly with a paper towel	• When visibly soiled • After personal hygiene processes • After contact with blood or other body fluids • Before and after wearing gloves - if hands are visibly soiled • 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 • No scrubbing with a nail brush • Surgical hand rub - • 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 • Use ABHR between theatre cases when hands are not visibly soiled

4.1.11.1 Alcohol hand rub technique

Using ABHR to perform HH is regarded as the gold standard.[60] 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 micro-organisms found on hands.

The World Health Organization (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[61]

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. The technique for using ABHR, has thus been modified **to start with the fingertips.**[62]

Method:

[60]World Health Organization (WHO). WHO Guidelines on Hand Hygiene in Health Care [Internet]. 2009. Available from: http://www. who.int/infection-prevention/publications/hand-hygiene-2009/en
[61]McDonald LC, Gerding DN, Johnson S, Bakken JS, Carroll KC, Coffin SE, et al. Clinical Practice Guidelines for Clostridium difficile Infection in Adults and Children: 2017 Update by the Infectious Diseases
[62]Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA). Clin Infect Dis. 2018;66(7):987–94.
Pires D, Bellissimo-Rodrigues F. Revisiting the WHO "How to Handrub " Hand Hygiene Technique : Fingertips First ? 2016;(Table 1):8–11.

Duration of the entire procedure takes 15 seconds minimum or as long as it takes for the alcohol to dry completely. See **Appendix 2**.

Note: The hand rubbing action starts with dipping the fingertips first into the palm containing ABHR

4.1.11.2 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.

4.1.11.3 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 OT 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 OT.

- 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.[63,64]

Pre-operative surgical hand rub technique

After the first handwash, ABHR may be used between cases if the hands are not visibly

soiled. The method is shown in **Appendix 4.**

[63]SA NDoH. 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

[64]World Health Organization (WHO). WHO Guidelines on Hand Hygiene in Health Care [Internet]. 2009. Available from: http://www. who.int/infection-prevention/publications/hand-hygiene-2009/en

4.11.3 Multimodal approach to improve hand hygiene compliance

Hand hygiene can be improved by following the WHO **multimodal improvement strategy**.[65]

The key components of the strategy are:

1. **System change (build it):** Ensuring that the necessary infrastructure is in place to allow health-care workers to practice hand hygiene - this includes two essential elements:
    - Access to a safe, continuous water supply, soap and towels
    - Readily accessible alcohol-based hand rub at the point of care
2. **Training/education (teach it):** Providing regular training on the importance of hand hygiene, based on the "My 5 Moments for Hand Hygiene" approach, and the correct procedures for hand rubbing and handwashing, to all health workers
3. **Evaluation and feedback (check it):** Monitoring hand hygiene practices and infrastructure, along with perceptions and knowledge among health workers, while providing performance and results feedback to staff. The WHO hand hygiene monitoring tool can be used to measure compliance
4. **Reminders in the workplace (sell it):** Prompting and reminding health-care workers about the importance of hand hygiene and about the indications and procedures for performing it
5. **Institutional safety climate (live it):** Raising awareness about the important of hand hygiene to promote patient safety amongst all levels, including -
    - Active participation at both the institutional and individual levels
    - Involve hospital administrators and supervisors in promoting and enforcing the guidelines
    - Awareness of individual and institutional capacity to change and improve (self-efficacy)
    - Partnership with patients and patient organisations[66]

4.1.12.1 Education and training (teach it)

- All new staff must receive training in IPC practices including HH
- Training should include ''how" and the ''when" of hand hygiene – the procedure of how to perform hand hygiene as well as the 'five moments of hand hygiene
- Encourage partnerships between mothers, patients, their families, and health workers to promote HH in the healthcare setting and at home

4.1.12.2 Compliance and monitoring (check it)

- Establish the overall HH compliance rate (baseline) of the HCF by directly observing health workers during routine clinical care
- Quarterly audits (200 observations per quarter) must be conducted, and results communicated to staff members and facility managers at the IPC Committee meetings
- Annual audit results can be compared with the baseline to document improvement
- It is recommended that each ward, department, or clinical area identify a HH champion - the HH champion should be the role model and monitor HH practices
- Indirect monitoring method can also be used, for example, by recording and tracking consumption of HH supplies during the period of a month. Total litres issued can be divided by average number of bed days and then expressed as a rate: litres (or ml) per 1,000 bed days

[65]WHO. A Guide to the Implementation of the WHO Multimodal Hand Hygiene Improvement Strategy. 2009. Available: https://www.who.int/publications/i/item/a-guide-to-the-implementation-of-the-who-multimodal-hand-hygiene-improvement-strategy
[66]A guide to the implementation of the WHO multimodal hand hygiene improvement strategy. 2009. Available: https://www.who.int/publications/i/item/a-guide-to-the-implementation-of-the-who-multimodal-hand-hygiene-improvement-strateg

- The WHO Observation Tool hand hygiene self-assessment framework (HHSAF) should be used to conduct the audits. This tool can be downloaded from ***https://www.who.int/gpsc/5may/tools/en/***
- There should be evidence that the WHO Hand Hygiene Self–assessment Framework tool is completed annually, and improvements made using Quality Improvement and Plan-do-study-Act (PDSA) cycles where gaps were identified. (see quality improvement, chapter 18)[67,68]

4.1.12.3 Posters

- Hand rub methodology posters must be placed at strategic places and above alcohol dispensers at the health facility
- HH posters serve as reminders in the workplace and can be strategically placed throughout the health facility
- These should be rotated and/or replaced to keep the message fresh
- HH posters must be laminated or framed and checked regularly to ensure integrity
- ***HH posters must be displayed:***
  - In all clinical areas for health workers
  - In toilets and bathrooms for patients and visitors

4.1.12.4 Hand hygiene campaign (live it)[69,70]

HH awareness campaigns should be conducted according to the Health Awareness Calendar, such as *World Hand Hygiene Day* on the 5th of May to create awareness and enhance compliance to HH. Reports thereof should be compiled and kept as evidence. Patient involvement in HH campaigns has proven to be effective in promoting compliance amongst health workers.

4.1.13 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).[71]

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 strategy*

4.2 Personal Protective Equipment

PPersonal Protective Equipment (PPE) is used by health workers (clinical and non-clinical) to protect themselves from blood and body fluids, pathogens, chemicals and heat. **The selection of PPE is based on a risk assessment of each situation and the level of anticipated exposure.** The appropriate use of PPE in different situations will be addressed in the following section.

[67]SA NDoH. 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
[68]WHO. A Guide to the Implementation of the WHO Multimodal Hand Hygiene Improvement Strategy. 2009. Available: https://www.who.int/publications/i/item/a-guide-to-the-implementation-of-the-who-multimodal-hand-hygiene-improvement-strategy
[69]WHO. Interim Practical Manual supporting national implementation of the WHO Guidelines on Core Components of Infection Prevention and Control Programmes. Geneva: World Health Organization; 2017.
[70]A guide to the implementation of the WHO multimodal hand hygiene improvement strategy. 2009. Available: https://www.who.int/publications/i/item/a-guide-to-the-implementation-of-the-who-multimodal-hand-hygiene-improvement-strateg
[71]SA NDoH. 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

The following principles are used to do a risk assessment and to establish what type of PPE should be used (Figure 13):

- Identify the hazard/problem/threat e.g., likelihood of exposure to blood and body fluids/pathogens when inserting an intravenous line.
- Evaluate the risk associated with the hazard e.g., contact with blood borne viruses (e.g., Hepatitis B).
- Determine appropriate ways to eliminate or control the hazard (e.g., wearing gloves when in contact with blood and body fluids).[72]

FIGURE 14: RISK ASSESSMENT FOR THE SELECTION OF PPE

The risk can be reduced by selecting the correct PPE and wear it appropriately (Figure 14).

FIGURE 15: REDUCE RISK WITH CORRECT PPE

4.2.1 Important points about the use of PPE

- PPE serves a very specific purpose and when contaminated, can be a transmitter of microbes.
- PPE provides some, but not total, protection to the user. PPE is only effective if used as part of a process and in combination with other IPC interventions.
- PPE has little or no value as a sole measure for containing pathogens, therefore hand hygiene is essential after removing gloves.
- The use of PPE without indication (to allay personal prejudice or fear) may increase the risk of infection.
- PPE is not a substitute for poor infection control practice (including lack of administrative or engineering controls) and procedures.
- All PPE has a finite or limited life and must be discarded after use as indicated, preferably after each procedure or after each patient use.
- PPE must be of good quality and be fit for purpose.[73]

Note: The same PPE (such as gloves and aprons) should never be used between different patients. It must be discarded after each patient contact.Types of PPE

[72]Dramowski. A., 2014. Infection Prevention and Control A guide for healthcare workers in low-resource settings. Bettercare
[73]SA NDoH. 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

4.2.2 *Types of PPE*

The selection of PPE will differ based on the risk of exposure and the mode of transmission of the pathogen, but each item serves a very specific purpose to protect the health worker.

4.2.2.1 *Gloves*

Gloves are recommended for the following reasons:

- To reduce the risk of contamination of the hands of health workers with blood and body fluids.
- To reduce the risk of transmission of micro-organisms to the environment, from the health worker to the patient and vice versa, as well as from one patient to another.
- Gloves should therefore be used during all patient-care activities that may involve exposure to blood and body fluid (including contact with mucous membrane and non-intact skin), during contact precautions and outbreak situations

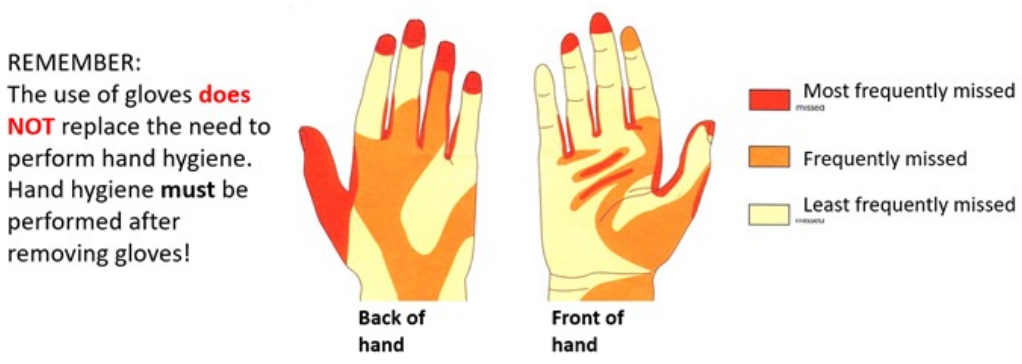
Gloves come in a variety of materials, but the common ones used in health facilities are listed below. Each type of material has advantages and disadvantages. **Table 8** provides an overview of the different types of gloves and their recommended use.[74]

Note: Gloves are not a substitute for hand hygiene. Gloves should only be used when indicated.

Wearing gloves does not replace the need for hand hygiene. Using gloves as a protective substitute for hand hygiene provides a false sense of security, as hands can become contaminated during a procedure even when gloves are used. Failure to remove gloves when it is not required is an infection control hazard and contributes to the spread of infection (for e.g., keeping gloves on after a procedure to write patient notes, not changing gloves between patient contacts or when answering the phone or engaging in any other activity).

Figure 16 demonstrates the areas that are most frequently missed during hand hygiene. It is important that hand hygiene is performed after removal of gloves.

FIGURE 16: FREQUENTLY MISSED AREAS ON HANDS



4.2.2.2 *Indications for donning and doffing of gloves*

Table 7 provides a summary of when gloves should be put on and removed.[75]

[74]SA NDoH. 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
[75]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

Table 7: Indications for donning and doffing of gloves

	Indication
Gloves on (Donning)	• Before a sterile procedure • When anticipating contact with blood or another body fluid, regardless of the existence of sterile conditions, including contact with non-intact skin and mucous membrane • Contact with a patient (and his/her immediate surroundings) during contact precautions.
Glove off (Doffing))	• As soon as gloves are damaged (or non-integrity suspected) • When contact with blood or body fluids, non-intact skin and mucous membrane has occurred and has ended. • When contact with single patient and his/her surroundings, or a contaminated body site on a patient has ended • When there is an indication for hand hygiene.

It is essential that gloves are changed between patients and hand hygiene is performed after removal of gloves.

Gloves must be worn according to **standard** and **contact precautions**. The glove pyramid **(Figure 15)** details some clinical examples in which gloves are not indicated, and others in which examination or sterile gloves are indicated. Hand hygiene should be performed when appropriate regardless of the indications for glove use.[76]

FIGURE 17: GLOVE PYRAMID

Health workers should be able to differentiate between specific clinical situations when gloves should be worn and changed and those where it is not required.

4.2.2.3 Types of gloves

Selection of non-powdered gloves is recommended because it avoids reactions with ABHR. **Table 8** provides a summary of different types of gloves and recommendations for use.[77]

[76]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
[77]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

Table 8: Glove types and indications for use [78]

Type	Type of material	Recommended use
Latex Gloves	• Designed to prevent contact with blood and body fluids. • Available in different sizes, lengths and can be sterile or non-sterile. • Elastic and provides a good fit. • Latex allergy is a concern	
	**Latex** Short cuff, non-sterile examination glove	• Routine use for non-sterile procedures where gloves are indicated.
	**Latex** **Sterile, cuff (individually wrapped)**	• All surgical procedures Sterile (aseptic) procedures
	**Latex** Long cuff, non-sterile	• Maternity & CSSD
Nitrile Gloves	• Less elastic than latex but does fit well and can prevent penetration of blood and body fluids. • Often recommended in cases of latex allergy • Are more puncture-resistant and more resistant to chemicals than latex gloves? • Not ideal for use in surgical procedures but may be used in other minor operations and aseptic procedures. • Diminished dexterity	
	**Nitrile** Mid- forearm	Viral haemorrhagic fever
	**Nitrile** Short cuff	EMS, in cases of latex allergy Non-invasive procedures Endoscopy
	**Vinyl Gloves** • Adequate for performing non-clinical activities.	Usually not sterile.
Type	**Type of material**	**Recommended use**
	**Plastic Gloves (Hampshire)** • Pressed on to a folded sheet of paper • Thin, plastic, poor seal	• Kitchen (Catering) • Pharmacy • Not recommended for direct clinical or patient care

[78] SA NDoH. 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

	**Domestic gloves** • Are made of reinforced latex	• Environmental cleaning • Kitchen and manual washing • Manual cleaning of medical devices (CSSD) • Should be colour coded for different areas of use.
	**Heavy duty and heat-resistant gloves** • Made of leather and reinforced to protect against sharps, heat and chemicals	• Removal of waste • Sterilisers in CSSD [79]

4.2.2.4 Important points for wearing of gloves

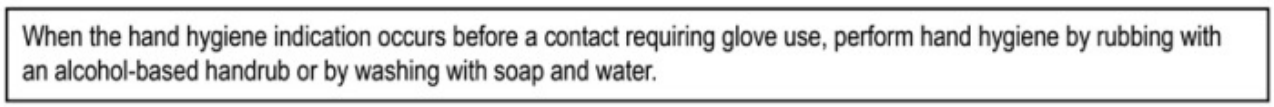
Figure 18 provides a visual summary of the important points to take into consideration when gloves are worn.

FIGURE 18: IMPORTANT POINTS FOR WEARING OF GLOVES

4.2.2.5 Donning and doffing of gloves

Figure 19 provides an illustration of how non-sterile gloves should be put on[80]

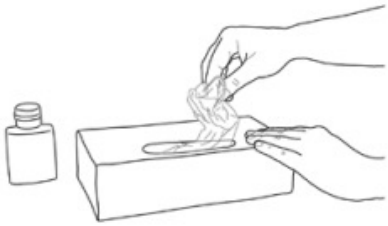
FIGURE 19: DONNING OF UNSTERILE GLOVES



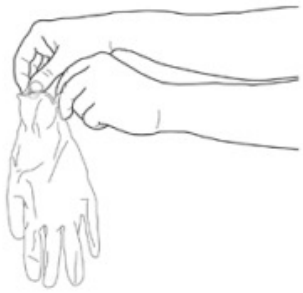
[79] SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic

[80] 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

FIGURE 20 DEMONSTRATES HOW NON- STERILE GLOVES SHOULD BE REMOVED



1. Take out a glove from its original box



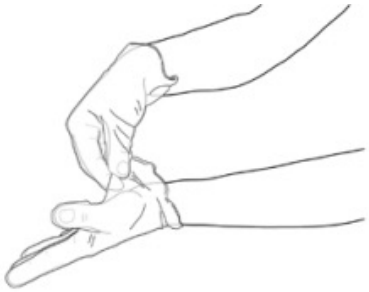
2. Touch only a restricted surface of the glove corresponding to the wrist (at the top edge of the cuff)

3. Don the first glove

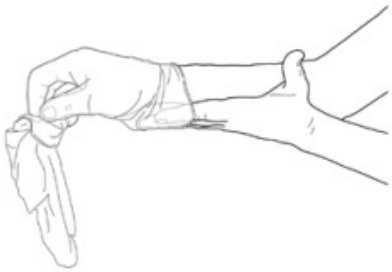
4. Take the second glove with the bare hand and touch only a restricted surface of glove corresponding to the wrist

5. To avoid touching the skin of the forearm with the gloved hand, turn the external surface of the glove to be donned on the folded fingers of the gloved hand, thus permitting to glove the second hand

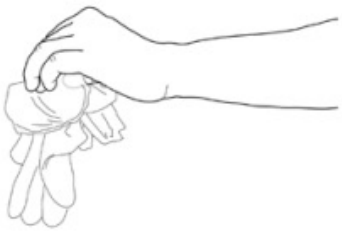
6. Once gloved, hands should not touch anything else that is not defined by indications and conditions for glove use



1. Pinch one glove at the wrist level to remove it, without touching the skin of the forearm, and peel away from the hand, thus allowing the glove to turn inside out



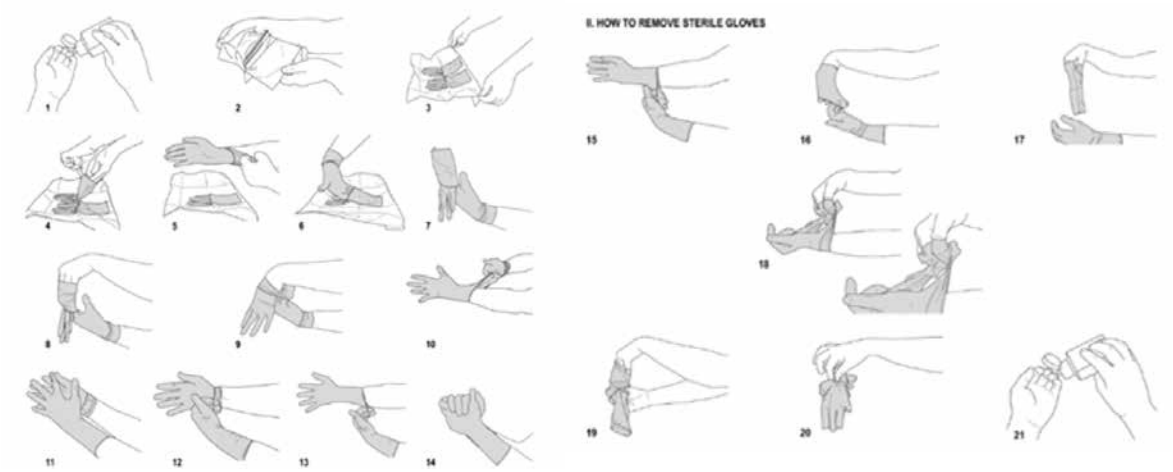
2. Hold the removed glove in the gloved hand and slide the fingers of the ungloved hand inside between the glove and the wrist. Remove the second glove by rolling it down the hand and fold into the first glove



3. Discard the removed gloves

4. Then, perform hand hygiene by rubbing with an alcohol-based handrub or by washing with soap and water

FIGURE 21 DONNING AND DOFFING OF STERILE GLOVES



For more detail on how to put on and remove sterile gloves, consult the *MoHSS Operating Theatre guideline, 2nd Edition 2023*.

4.2.3 Face Covers

Face covers are recommended for reducing infectious droplets from a person (source) to another person in close proximity. As part of respiratory etiquette, always covering the mouth and nose with a tissue, cloth, or the crook of the elbow, when coughing or sneezing, is advised. Cloth masks are not recommended for use in healthcare.

The more frequent use of face covers is when delivering healthcare, the purpose of which is to prevent droplets and aerosols from reaching the mucous membranes of the nose and mouth, and to reduce inhalation of infectious pathogens by the health worker. The use of face shields is increasing to provide added protection to health workers.

The two common face covers used in clinical practice are surgical face masks and respirators. Surgical face masks should cover the nose and mouth for surgical or other procedures. Respirators are designed to prevent the inhalation of fine aerosols.

All types of face covers, (masks and respirators) must fit well to provide maximum benefit to the user

Face covers serve two purposes:

- To prevent or reduce the transmission of droplets and aerosols between health workers and patients.
- To prevent splashing of mucous membranes during procedures.

4.2.3.1 Surgical masks

Surgical face masks are made of several layers of paper with nonwoven polypropylene spunbond inserted between the outside layers. They protect the health worker against infectious droplets and splashes of blood or body fluids, but do not provide adequate protection against small particle aerosols. They create a short-term barrier against dispersal of large droplets during coughing or sneezing. Surgical masks may become inefficient after 15 minutes of continuous use and should be changed when damp or soiled. They should be discarded before going on a break and a fresh surgical mask worn.[81]

[81] 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/

4.2.3.2 Indications for surgical masks

- Nursing large open burns
- Performing deliveries
- Preparation of cytotoxic medication and hyper alimentation
- Intravenous therapy (central venous lines, exchange transfusions, cut downs)
- Insertion of an underwater drain
- Biopsy procedures
- Major wound suturing
- Droplet precautions
- **Patients with pulmonary TB** who are undergoing treatment especially during the first two weeks of starting treatment.[82]

Table 9 demonstrates step-by-step how to put on a mask and ensure that it fits properly.

Table 9: Donning a face mask

How to wear a face mask				
				
Wash your hands	Hold the mask by the strings and tie the top string with a bow	Tie the bottom in a bow	Fit the metal strip to the nose bridge	Task completed

Table 10 demonstrates step-by-step how to remove a mask.

Table 10: How to doff a face mask

Removing a Face mask		
		
Untie bottom string, then top string	Dispose of immediately [83]	Wash your hands

Note: Face masks should be discarded after use.
Face masks with attached visor offers protection to the eyes against minor splashes.

The most essential types of face covers and their recommended use are shown in **Table 11.**

[82] SA NDoH. 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
[83] https://www.istockphoto.com/illustrations/face-mask-disposal

Table 11: Types of face covers and indications for use [84]

Type of Cover	Recommended use	
	Surgical face mask	• For use in theatres, outpatient settings, sterile procedures • PPE for airborne precautions for visitors & patients: measles, varicella, drug-sensitive PTB (see transmission-based precautions) • PPE for droplet precautions e.g., influenza or within 1 meter from a patient • Face masks should be discarded after a single use. • **DO NOT use a surgical face mask with the lower ties either undone or cut off!**
 	Goggles	• Goggles protects the mucous membranes of the eyes from splashes. • Wear during deliveries, operating theatre, casualty, mortuary and in dental clinics • PPE for droplet precautions when invasive procedures are performed. • Goggles do not provide splash or spray protection to other parts of the face. • Need to fit comfortably over spectacles, be light in weight, adjustable, provide clear vision without fogging, and be re-usable and therefore washable.
	Face mask with visor	• Face masks with visors protect mucous membranes against splashes and replace a goggle and mask combination. • These are indicated in any risk prone procedure which involves light to moderate splashes from blood or body fluids.
	Face shields or visors	• Face shields may be used in conjunction with a surgical mask or respirator to protect eyes and mucous membranes. • During aerosol generating procedures. • During close contact with COVID-19 patients.
 	Respirators without valves Cone shaped respirator Duckbill shaped respirator	• Pulmonary TB • Pulmonary MDR-/XDR-TB airborne precautions • Prolonged care of a patient with pulmonary MDR-/ XDR-TB • Health worker contact with patients with varicella (chickenpox) or measles • Aerosol generating procedures on COVID-19 patients.52 • For high-risk procedures: • Bronchoscopy • Open or closed suctioning of patients with TB • Dental procedures on patients with known TB especially MDR-/ XDR-TB

[84] SA NDoH. 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

	Respirator with valve: Flat or cone shape	• Expiratory valves are used when prolonged contact with the patient (over one hour) is expected. • For use with patients with MDR- and XDR-TB. • Exhalation valves on respirators are discouraged as they bypass the filtration function for exhaled air by the wearer (not indicated for source control)
	Paper mask (Queen Charlotte)	Not recommended for use in health facilities as it offers no protection against inhaling microorganisms.[85]

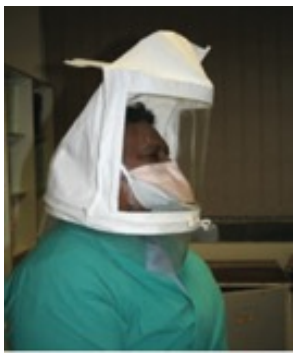
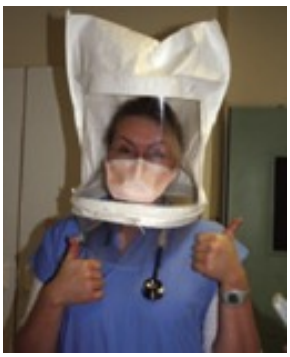
4.2.3.3 Respirators

Respirators have been introduced into healthcare practice, mainly because of the risk from MDR-and XDR-TB but are recommended for use when nursing patients with pulmonary TB (PTB). More recently, respirators are recommended for health worker performing aerosol generating procedures on patients with respiratory diseases such as COVID-19 patients. The respirator is only moderately water resistant. It is designed to filter out 95% of noxious substances carried in the air, including biohazardous pathogens such as *Mycobacterium tuberculosis*. **Respirators should never be worn by patients.**

Face types and shapes differ, as do designs of respirators. Fit testing is recommended to ensure an adequate fit and maximum protection and to prevent air leaks around the edges of the respirator. See the Fit test for respirators **(Table 12).**

- Once the correct respirator has been selected, further fit testing is not necessary if the same type of respirator is used, and the wearer's face has not changed due to significant weight loss or gain.
- Respirators must be donned correctly.
- Respirators are only efficient if they are correctly moulded to the person's face and there is no air leakage around the edges of the respirator during an intake of breath.
- Respirators straps must go around the head (not just the ears), to give a perfect face seal- if you can breathe easily for hours at a time, the fit is incorrect.[86]

Table 12: Fit test for a respirator [87]

		
A respirator is worn, and a sealed hood is put over the head of the wearer.	A substance, such as saccharin, is aerosolised into the hood and the person indicates whether it can be tasted.	The respirator is adjusted to fit, until the substance can no longer be tasted. The respirator has passed the fit test.[88]

[85]SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. 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

[86]SA NDoH. 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 tion-and-control-strategic

[87]SA NDoH. 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

[88]SA NDoH. 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

Table 13 illustrates how a respirator should be donned

Table 13: Donning a respirator [89]

	
Release the lower headband from your thumbs and position it at the base of your neck.	Position the remaining headband around the crown of your head.

Respirators with ear loops do not provide a sufficiently tight face fit and will require a clip across the back of the head to ensure a good seal.

4.2.3.4 Seal checks

A seal check is a procedure conducted by the health worker that wears the respirator to determine if the respirator fits properly. A seal check must be performed every time a respirator is worn. The seal check can either be a positive pressure or negative pressure check **(Table 14).**

4.2.3.4.1 Negative pressure seal check

For cone shape respirator:

- Cup hands over respirator without excessive pressure. Breathe in sharply. A light collapse of the respirator should be felt with no air leaking in around the face to-face piece seal. **(Table 14a)**.

Duckbill respirator:

- Breathe in sharply. The respirator should collapse inwards **(Table 14b).**

4.2.3.4.2 Positive pressure seal check

Cone shape respirator:

- Cup hands over respirator. Blow out. A build-up of air should be felt with no air leaking out around the face-to-face piece seal edges of the device.

Duckbill respirator:

- Breathe out forcefully; the respirator should expand on the exhale **(Table 14c**).[90]

[89]SA NDoH. 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-strategi
[90]SA NDoH. 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

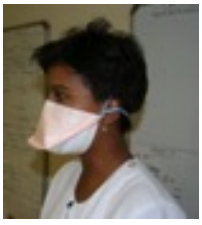
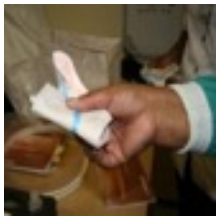
Table 14: Seal check

		
a) Negative and positive pressure seal check for cone shaped respirator	b) Negative pressure seal check for duckbill respirator	c) Positive pressure seal check for duckbill respirator

4.2.3.5 Re-use of a respirator

- Limited reuse depending on the local conditions and has been recommended and widely used as an option for conserving respirators during respiratory pathogen outbreaks and pandemics.
- Reuse refers to the practice of using the same respirator for multiple encounters with patients but removing it after each encounter. The respirator is stored in between encounters to be put on again prior to the next encounter with a patient. For tuberculosis prevention, CDC recommends that a respirator classified as disposable can be reused by the same worker if it remains functional and is used in accordance with local infection control procedures. There is a limit to the number of times the same respirator is reused, often referred to as "limited reuse". [91,92]
- It is recommended that respirators are discarded after it is used for 8 hours **continuously.**[93,94]
- Or up to one week if used intermittently.
- Respirator should be discarded immediately when it becomes contaminated, damp, mis formed or damaged.
- The same respirators should never be shared between different health workers.
- The respirator should be removed carefully using a paper towel and placed in a paper (not plastic) bag, labelled with the health worker's name, to avoid damage. See Table 15 for the on how to remove a respirator for re-use.
- Perform hand hygiene immediately afterwards.
- Deterioration of respirator efficiency occurs with humidity, dirt and crushing.

Table 15: Demonstration of the re-use of respirators [95]

Reuse of Respirators			
			
Wearing respirator	Hold respirator with clean towel	Carefully remove elastic bands while holding respirator	Wrap in paper towel and store in paper bag with name on it

[91] IOM: Reusability of facemasks during an influenza pandemic: facing the flu. Washington, D.C.: National Academies Press, 2006.
[92] https://www.cdc.gov/niosh/topics/hcwcontrols/recommendedguidanceextuse.html#ref2
[93] APIC Position Paper. 2009. Extending the Use and/or Reusing Respiratory Protection in Healthcare Settings During Disastershttps://www.apic.org/Resource_/TinyMceFileManager/Advocacy-PDFs/APIC_Position_Ext_the_Use_and_or_Reus_Resp_Prot_in_Hlthcare_Settings1209l.pdf
[94] CDC. NIOSH. Questions and Answers. https://www.cdc.gov/niosh/docs/2018-128/pdfs/2018-128.pdf
[95] SA NDoH. 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

Note: Respirators may be reused as long as is not wet, contaminated and it is not damaged, or the integrity is not compromised.

Table 16: Respirator doffing technique [96]

		
Without touching the respirator, slowly lift the bottom strap from around your neck up and over your head	Lift off the top strap. Do - do not touch the respirator.	Store respirator in a paper bag with your name on it. Do and do not crush the respirator when storing it.

4.2.4 Face Shields

Face shields are used to protect the eyes and mucous membranes of the user from splashes and aerosol. It does not have a good fit and therefore should be used in conjunction with a face cover such as a surgical mask or respirator. The face shield must be cleaned thoroughly with soap and water and wiped dry. If disinfection is required, the external surface may be wiped with a 70% alcohol swab.[97]

4.2.5 Aprons

Plastic aprons are used more often than gowns because they are cheaper, fluid resistant, and disposable and are recommended for use in clinical settings. They protect health workers clothes from microbial contamination and fluids. They are easy to handle and offer protection to the front of the body that is exposed to most contamination.

- Plastic aprons should be available in all HCFs and should be used as recommended.
- Aprons are worn to protect clothes from splashes during a clinical procedure or during contact precautions **(Table 17)**
- Plastic aprons are water resistant but can become contaminated and may transmit pathogens if used between patients.
- Aprons are single patient use only and must be discarded at the end of each procedure.
- The re-use of plastic aprons after cleaning with a disinfectant is not recommended.
- **Routine use of aprons is not recommended.**

Plastic aprons are available in different colours if colour coding is required.

[96] SA NDoH. 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
[97] SA NDoH. 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

Table 17: Plastic aprons - recommended use and technique

Type	Recommended use
	Disposable plastic aprons are worn when: • Splashing, exposure to blood or body fluids is expected. • During environmental cleaning. • When washing items in the sluice. • Decontaminating of medical devices either in CSSD or other areas. • Handling casualties and grossly contaminated wounds. • Performing stomach and bowel washouts. • Handling contaminated linen. • Working in CSSD.
	• Don an apron so that it covers the entire front and sits high on the chest. • Do not walk around with the tapes untied. • •To remove an apron, break the neck band and fold the bib section down. Break the waist ties and fold the apron inside out, thus containing the contaminated/exposed surface inside. • Discard in a biohazardous waste container.
	• Heavy duty aprons are often made from PVC. • It is mostly used for waste removal. • For operating the incinerator (heat resistant)
	• Heavy duty for surgeons and maternity • Ensure that a cleaning procedure is in place after use

4.2.6 Gowns

Gowns and other protective equipment are worn to provide barrier protection and reduce the opportunities for transmission of microorganisms in hospitals. These gowns are specially designed to make them impermeable to liquids, but it is expensive.

Cloth or cotton gowns are not recommended since these are not water resistant. Sterile cotton gowns are used in the operating theatre and labour ward but should be used in conjunction with a plastic apron underneath to prevent soaking of clothes.

Commercially available **non-woven water-resistant gowns** and **coveralls** with a layer of waterproof material for the front and arms are usually expensive and are used in selected indications such as when treating a bleeding patient with viral haemorrhagic fever. **Table 18** provides an overview of different types of gowns and their recommended use.[98]

[98]SA NDoH. 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

Table 18. Types of gowns and their use

Type	Recommended Use	
	Cloth or cotton gowns Sterile gowns	• Re-usable; laundered and sterilised • Used in OT and labour ward ONLY. • Used with plastic apron underneath (if indicated) to reduce fluid contamination. • Theatre • Treating large burn wounds • Deliveries • Aseptic procedures e.g., insertion of central venous pressure lines • Preparation of certain medication e.g., parental feeding
	Non-woven water-resistant gowns	• Disposable • Used when treating bleeding patients with viral haemorrhagic fever or other highly infectious diseases
	Coveralls	• Water resistant • Disposable **Note:** These are very uncomfortable to wear for prolonged periods of time, especially in hot and humid situations - there is further a **risk of contamination during removal**

4.2.7 Head covers

The routine use of head covers of any type has been abandoned since there is no scientific evidence for their use, and it is an additional expense. Head covers (made up of non-woven water-resistant material) are only recommended when working in a sterile environment or where clean items are processed.

4.2.7.1 Head covers are indicated for use in:

- OTs for both staff and patients
- The clean section of the CSSD
- Processing of sterile feeds
- Sterile fluid production in the pharmacy
- Preparation of food

Under exceptional circumstances, head covers are recommended when attending severely immune compromised patients such as patients having had a bone marrow transplant.[99]Cloth head covers used in theatre should be washed as part of the theatre laundry (scrubs) and not at home by health workers.

[99]SA NDoH. 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

4.2.8 Shoes/boots and overshoes/shoe covers

Closed toes shoes are recommended for use by all health workers in the clinical setting. This is to ensure that they are protected in case of accidental spillage or dropping of sharp instruments. Sandals are not recommended when working in clinical areas. These rules apply to all categories of health workers.

4.2.8.1 Overshoes/shoe covers

Overshoes/shoe covers should not be used in the general healthcare environment. By touching the shoes when putting on and removing overshoes, hands become contaminated. Overshoes can result in creating an aerosol while walking and can transmit microbes from the floor to the environment and the patient's surrounding area.[100,101]

Overshoes may be issued to visitors to the OT who do not have dedicated "inside shoes". Although their use is not recommended, if these are to be used, care must be taken to decontaminate hands using ABHR after donning and doffing of overshoes. Although there is no evidence of transmission via this route, it is still recommended that disposable, knee-length over-boots or gumboots should be worn when caring for patients with viral haemorrhagic fevers. **Table 19** provides an overview of the different types of shoes that can be used and where.

Table 19: Shoes and their use [102]

Theatre footwear	Boots	Non-theatre footwear
Dedicated footwear, e.g., closed shoes or clogs with heel support straps, when protection from splashes and sharp instruments is required e.g., in the OT	• Boots should be worn by staff when: • Handling healthcare risk waste • Treating patients with viral haemorrhagic fevers, if disposable over-boots or coveralls with attached booties are not available	Footwear in non-theatre settings should:
• Have closed toes • Be clean and well maintained (it is recommended that a designated washer-disinfector be used - in the absence of a washer-disinfector - theatre shoes must be hand washed) • Easy to clean • Non-slip/with good traction • Support the foot • Enclose the foot	• Should be white in colour to show any contamination [103]	• Be soft-soled and have closed toes • Have low heels • Be non-slip with good traction • Be clean and well maintained • Support the foot
		

[100]Patient shoe covers: Transferring bacteria from the floor onto surgical bedsheets. Article (PDF Available) in American journal of infection control 44(11) · May 2016 with 585 Reads. DOI: 10.1016/j.ajic.2016.03.020

[101]Galvin, Justin & Almatroudi, Ahmad & Vickery, Karen & Deva, Anand & Kelly Oliveira Lopes, Lillian & Costa, Dayane & Hu, Honghua. (2016). Patient shoe covers: Transferring bacteria from the floor onto surgical bedsheets. American Journal of Infection Control. 44. 10.1016/j.ajic.2016.03.020.

[102]SA NDoH. 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

[103]SA NDoH. 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

4.2.8.2 When to put on/remove dedicated footwear

Where dedicated footwear is used, for example, in CSSD, clean rooms or minor surgery, it should be removed before leaving the OT complex or clean area. Dedicated footwear is usually stored in the dressing rooms, and this is where the exchange between outside and inside footwear is made.

4.2.8.3 Cleaning of footwear

It is the responsibility of the wearer to ensure that theatre footwear is washed and disinfected appropriately in a designated washer-disinfector when visibly contaminated, according to the manufacturer's recommendation. There is no cleaning requirement for footwear used in non-theatre settings unless they become contaminated with blood or body fluids; in which case they should be cleaned appropriately.

4.2.9 Caps

Caps are worn to prevent hair, dandruff, or organisms on hair from landing in wounds or sterile surfaces or sterile instruments. It also protects the hair from splashes of blood and body fluid to a lesser degree. Caps should only be worn in the OT and in the Central Sterile Services Department (CSSD). When worn, all hair as well as the forehead should be covered. The balaclava type of cap is worn in cases of highly infectious diseases such as VHF.

4.2.10 Donning and doffing of PPE

The donning and doffing of PPEs are a critical process that requires significant care.

Appendices 5 and 6 illustrate the procedures for donning and doffing of PPE.

An educational video demonstrating safe donning and doffing of PPE can be downloaded from https://www.youtube.com/watch?v=pALwrpG7SWc

Table 20 provides an overview of types of PPE that should be used for different procedures

Table 20: Types of procedure and recommended PPE

Procedure	Hand hygiene	Gloves	Aprons	Masks	Eye cover
					
IV cannulation	√	√	√		
Wound dressing	√	Aseptic technique	√	√	
Insertion of NG tube	√	√	Gowns	√	High speed drills
Insertion of airway	√	Sterile √	√	√	√
Dental procedures	√	√	√	√	√
Suturing	√	Sterile √	√	√	√
CVP lines	√	Sterile √	√	√	√

Insertion of urinary catheter	√	Sterile √	√	√	√
Fibre-optic procedures	√	√	√	√	√
Delivery labour	√	long sleeve √	long sleeve sterile gowns √	√	√
Surgery (clean and dirty)	√	Sterile √	Sterile Gowns √	√	√
Lumber puncture	√	√	√	√	√

4.3 Injection safety procedures and sharp management

This section summarises the safe use and disposal of sharps and complements the *Phlebotomy, Blood Donation and Parenteral Therapy Guidelines for Namibia* (2014).[104] Avoiding the use of unnecessary injections is the starting point of injection safety. It is important that every health worker knows how to use and safely dispose of needles and syringes immediately after use. If injections are medically indicated they should be administered safely, avoiding any possible harm to the recipient, administrator, community, and the environment.

WHO defines injection safety as:

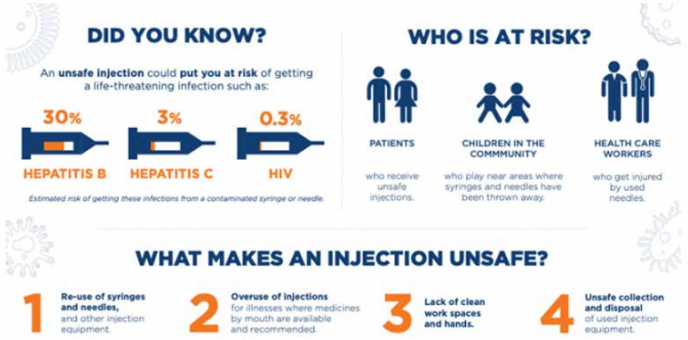
- A safe injection that does not harm the recipient
- Does not expose the provider to any avoidable risks
- Does not result in waste that is dangerous for the community

Injections are one of the most frequently used medical procedures. Unsafe injection practices (especially needle and syringe re-use) occur and place both staff and patients at risk of infection with blood-borne viruses (BBVs).[105]

What makes injections unsafe **(Figure 22)**:

1. Re-use of syringes and needles and other injection equipment
2. Overuse of injections where medication can be administered by mouth
3. Lack of clean workspace and inadequate hand hygiene of health workers
4. Unsafe collection and disposal of used injection equipment

FIGURE 22: UNSAFE INJECTION PRACTICES



4.3.1 Seven steps to safe injections

The steps for safe injection management are detailed in **Table 21**.[106]

[104] Blood Donation and Parenteral Therapy Guidelines for Namibia (2014
[105] World Health Organization. WHO best practices for injections and related procedures toolkit. March 2010. Available from: https://apps.who.int/iris/bitstream/handle/10665/44298/9789241599252_eng.pdf?sequence=1
[106] 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_health-careproviders_leaflet.pdf?sfvrsn=bb7f4169_7&ua=1

Table 21: Seven steps to safe injections

Step	Action	Description
Step 1	Clean workspace	A clean workspace is necessary to avoid contamination and allow safe injection preparation
Step 2	Hand hygiene	***Always perform hand hygiene:*** • Before preparing the injection, before administration and after administration of the injection • Avoid giving injections if skin integrity is compromised by infection or skin condition
Step 3	Sterile safety engineered devices	Always use a new syringe and needle from a new sealed package
Step4	Sterile vial of medication and dilutant	***Use single dose rather than multidose vials:*** • Many outbreaks have been associated with the use of multidose vials • Preservatives are effective, but do not eradicate microbial contamination in multidose vials
Step 5	Skin cleaning and antisepsis	• Use 60-70% alcohol (isopropyl alcohol or ethanol) on a single swab or cotton wool ball
Step 6	Appropriate collection of sharps	• Never recap needles • Place uncapped syringes and needles as a unit directly into sharps containers immediately after use • Sharps containers should be accessible at every point-of-care and within arm's reach
Step 7	Appropriate waste management	• Prevent contaminated sharps that are not appropriately disposed of • Sharps in the environment expose the community to needle stick injuries • Children often pick up and play with sharps on waste sites

4.3.2 Important points about injection safety practices

- When reconstituting and administering injections, a sterile syringe and needle should be used every time a multi-dose vial is entered to withdraw medication
- Do not leave a needle in the stopper of the vial
- When opening an ampoule with a file, protect the fingers by using clean small gauze
- Avoid the contamination of injection equipment and medication during the process of administering
- Do not use medication that has expired or has breaches of integrity
- Follow the prescribed storage and packaging instructions of each product
- Always wear gloves when carrying out a venepuncture (intravenous) procedure
- Avoid recapping of needles
- Use a single hand "scoop" technique if the needle must be re-capped/or use a mechanical device for holding the sheath
- Use the safety technique of a neutral zone ("put down-pick up") in OTs when passing sharps, to avoid hand-to-hand contact
- Transport used needles safely, in a receiver (e.g., kidney dish) to the disposal area if the sharps container is not at within immediate reach
- When sharps containers are full (3/4 of total capacity), they should be sealed and not opened again
- Sealed containers should be stored in a safe, designated place (e.g., the sluice room) for incineration
- Ensure sharps containers are fixed to surfaces and closed to avoid spillage during transportation[107]

[107]SA NDoH. 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

- Never dispose of sharps in plastic bags or garbage cans - only in the sharps containers provided
- Never stick needles into mattresses

4.3.3 Safety engineered devices (SEDs) [108, 109]

There are two types of SEDs available for the protection of health workers, patients, and the public.

1) **'Sharp injury protection'** and
2) **'Re-use prevention',** both used for delivery of medication by health workers by intramuscular, subcutaneous, and intradermal route. Both have different mechanisms of safety and clear indications for use

SEDs should be used wherever and whenever possible to reduce needle stick injuries and to ensure that the injections are safely discarded

Figure 23 provides examples of different safety engineered devices

FIGURE 23: SAFETY ENGINEERED DEVICES

4.3.4 Multi-dose vials (MDVs)

MDVs are a major source of cross infection and outbreaks of Hepatitis B and C in healthcare. The reintroduction of a used needle to refill the syringe as well as leaving a hypodermic needle in the diaphragm of the MDV from which a used syringe is filled, is common practice. **It is however unacceptable and poses a significant risk of contamination of the content.** The safest way to use an MDV is to insert a spike with a non-return valve to ensure there is no contamination and that sterility of the solution is maintained.

The diaphragm of the vial should always be cleaned with 70% alcohol and rubbed for 15-30 seconds if a spike is not used, prior to access. **Syringes should not be prefilled from a multidose vial and then stored.** MDVs should be stored as per the manufacturer's recommendation.[110]

Note: Multidose vials should be avoided as much as possible

4.3.5 Sharps injury

Health workers should know their Hepatitis B immune status and if possible, their HIV status.
If an accidental sharps injury occurs the following steps should be followed:

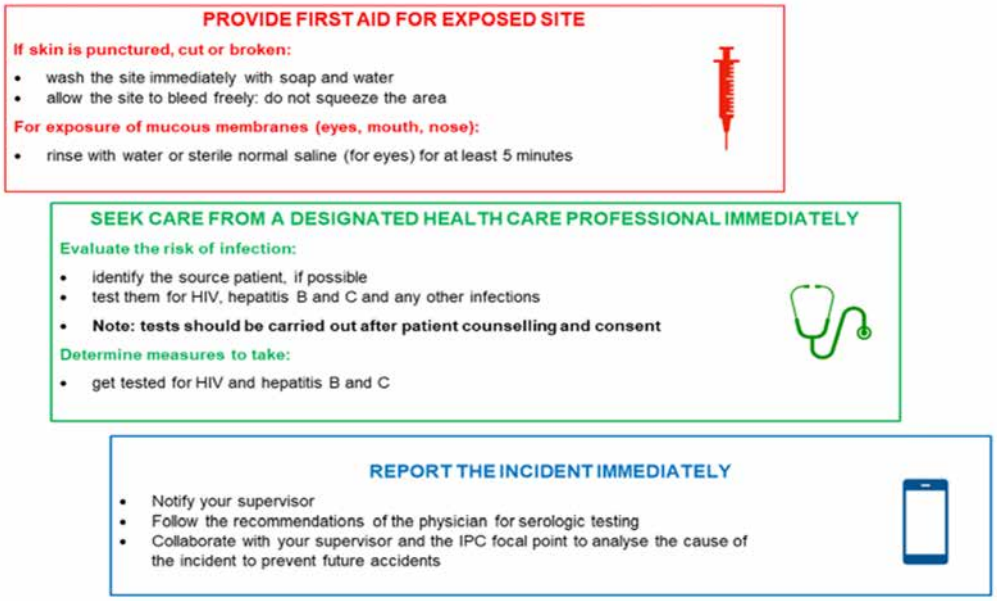
- Allow free bleeding

[108] WHO guideline on the use of safety-engineered syringes for intramuscular, intradermal and subcutaneous injections in health care settings.
[109] https://www.buildingbetterhealthcare.com/news/article_page/NHS_trusts_fail_to_implement_safer_sharps_despite_new_EU_regulations/95958
[110] SA NDoH. 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

- Wash under running water immediately
- Inform your immediate supervisor
- Get a blood sample from the source (after obtaining consent), depending on the current policy (regarding either patient, or sharps discarded incorrectly in waste) and a good clinical history relating to blood-borne diseases
- Report to the Occupational Health Department or designated persons
- It may be required to give a sample of blood if the immune status of the health worker is not known
- Hepatitis B immunisation booster might be required
- Post exposure prophylaxis (PEP) will be offered after counselling

Figure 24 provides a summary of the notification and management process Consult the Namibian PEP guidelines and Standard Treatment Guidelines for the detail of the management of exposure.[111/112]

FIGURE 24: NOTIFICATION PROCESS



4.4 Respiratory hygiene and cough etiquette

Respiratory hygiene and cough etiquette are IPC measures designed to limit the transmission of respiratory pathogens by droplet or airborne routes. To prevent the transmission of all respiratory infections in healthcare settings, the following IPC measures should be implemented at the first point of contact with a potentially infected person.

Rapid triage of patients presenting with respiratory symptoms is strongly recommended [113]

4.4.1 Visual alerts

Post visual alerts at the entrances, waiting areas and wards of HCFs instructing patients and persons who accompany them to inform health workers of symptoms of a respiratory infection when they first register for care and to practice respiratory hygiene/cough etiquette.[114] (Appendix 7[115,116]) During respiratory viral epidemics such as COVID-19, face masks are compulsory, and messaging should be widespread.

[111]Namibian Standard Treatment Guidelines.2021
[112]MoHSS National Guideline Post-Exposure Prophylaxis for HIV, HBV and Tetanus after workplace exposure and sexual assault
[113]World Health Organization. WHO guidelines on tuberculosis infection prevention and control, 2019 update. Geneva. 2019
[114]Centre for Disease Control and Prevention (CDC) [Internet] Available from https://www.cdc.gov/flu/professionals /infectioncontrol/resphygiene.htm
[115]Centre for Disease Control and Prevention (CDC) [Internet] Available from https://www.cdc.gov/flu/prevent/actions-prevent-flu. htm?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fflu%2Fprotect%2Fhabits%2Findex.htm
[116]SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic

4.3.2 Respiratory hygiene/cough etiquette posters (sell it)

The following measures to contain respiratory secretions are recommended for all individuals with signs and symptoms of a respiratory infection.

- Cover the mouth and nose with a tissue when coughing or sneezing
- Discard tissue in the nearest waste bin after use
- Perform HH after having contact with respiratory secretions and contaminated objects/ materials[117]

HCFs should ensure that consumables for adhering to respiratory hygiene/cough etiquette in waiting areas are available to patients and visitors.

- Provide tissues and no-touch bins for disposal of used tissues
- Provide conveniently located dispensers of ABHR and enough soap and disposable paper towels when indicated

Ensure that posters explaining cough etiquette are available and visible

4.4.3 Masking and separation of persons with respiratory symptoms

Patients and visitors that are coughing should be:

- Offered surgical face masks
- Encouraged to sit at least 1.5 metre away from others in common waiting areas, space and chair availability permitting
- There should be good ventilation in the waiting area
- Triaged rapidly in all HCFs and expedited to consultation rooms
- Do a risk assessment on all patients when they first present to the health facility and as part of the triage process establish risk of transmission of a MDRO or infectious disease
- Implement droplet precautions in addition to standard precautions, when examining a patient with symptoms of a respiratory infection[118] - see Chapter 10 for detailed transmission-based precautions

4.4.4 IPC guidelines for TB, MDR-TB, and XDR-TB

Infection control measures should be established to reduce the risk of TB transmission to the general population and to health care personnel. The Namibian TB guidelines provide more detail about the IPC interventions to prevent the transmission of PTB. In addition, the WHO TB-IPC guideline (2019) can be consulted.[119,120]

4.5 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.[121]

The following questions about possible exposure events should be asked during the risk assessment:

- Travel history

[117] SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic
[118] Centre for Disease Control and Prevention (CDC) [Internet] Available from https://www.cdc.gov/flu/professionals /infectioncontrol/resphygiene.html
[119] World Health Organization. WHO guidelines on tuberculosis infection prevention and control, 2019 update. Geneva. 2019 https:// apps.who.int/iris/bitstream/handle/10665/311259/9789241550512-eng.pdf?ua=1
[120] SA NDoH. 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
[121] Dramowski, A., 2014. Infection Prevention and Control A guide for healthcare workers in low-resource settings. Bettercare

- Occupation and Hobbies
- Previous and recent exposure to healthcare facilities
- Previous infection or colonisation with MDROs
- Recent antimicrobial treatment[122]
- Cough (duration, weight loss, night sweat, loss of appetite, malaise, haemoptysis)
- Fever
- Rash
- Diarrhoea

Table 22 provides a summary of the degree of risk. Risk is calculated by taking the following factors into consideration: **RISK = exposure x probability x severity.**

For example: A patient with a draining wound recently admitted in a healthcare facility for surgery 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

Table 22: Risk-assessment infection control grid

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

Ensure adequate communication regarding the risk assessment conducted to receiving facilities nursing units, healthcare facilities and EMS.[123]

Consult Chapter 15 on Risk Management for more detail on how to perform a risk assessment.

4.6 Principles of asepsis

Aseptic technique is a general term involving practices that minimise the introduction of micro-organisms to patients during patient care. There are two categories of asepsis:

- General asepsis applying to patient care procedures outside of the OT
- Surgical asepsis relating to procedures/processes designed to prevent surgical site infection

Aseptic techniques are used to reduce the risk of post-procedure infections and to minimise the exposure of health workers to potentially infectious micro-organisms. Aseptic techniques include practices performed just before, during, or after any invasive procedures. Poor adherence to aseptic techniques results in considerable morbidity and mortality. To reduce procedure-related HAIs, a set of infection prevention bundles have been established which, when followed correctly, have proven to be effective in preventing HAIs.[124]

4.6.1 Recommendations for asepsis

- Several non-surgical procedures require aseptic techniques in order to prevent transmission of infectious agents particularly during the placement of devices into sterile body spaces

[122]SA NDoH. 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
[123]SA NDoH. 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
[124]http://www.ihi.org/Topics/Bundles/Pages/default.aspx#targetText=A%20bundle%20is%20a%20structured,proven%20to%20 improve%20patient%20outcomes.

- The introduction of a sterile item into a patient should always be performed with a no- touch-technique. **This means that the skin around insertion should not be touched after skin antisepsis has been applied**
- Aseptic techniques are practiced with all invasive medical procedures such as insertion of central venous and peripheral lines, surgery, or inserting a urinary catheter

See Chapter 15 for further information about bundles.

Most HAIs are attributed to actions of health workers who either ignore or are unaware of basic concepts of aseptic techniques including HH aseptic procedures. Education and training of all health workers is essential to ensure safe practices.[125]

[125]SA NDoH. 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

CHAPTER 5: HEALTHCARE WASTE MANAGEMENT

The fundamental principle of waste management is minimising the volume of healthcare waste (HCW) through appropriate classification and segregation and the safe disposal of HCW, which is embedded in the Integrated Waste Management Plan (2012). This section summarises the process of healthcare waste management in healthcare facilities. Every individual concerned with generation, handling and disposing of medical waste should ensure the correct handling and safe disposing of waste, while wearing appropriate personal protected equipment (PPE) if indicated.

HCW management is governed by national and international legislation set out to protect health workers, the public, handlers of waste and the environment and to ensure that waste is managed effectively. The following legislation applies:

- National Waste Management Policy (NWMP), 2011
- Integrated Health Care Waste Management Plan (IHCWMP), 2012
- Public and Environmental Health Act, 2015 (Act No. 1 of 2015)
- Atmospheric Pollution Prevention Ordinance 11 of 1976
- Stockholm Convention, 2001[126]
- Environmental Management Act, 2007(Act No. 7 of 2007)
- Waste Management Act, 2000 (Act No. 8 of 2000)

The legislation requires that all health facilities that generate healthcare waste:

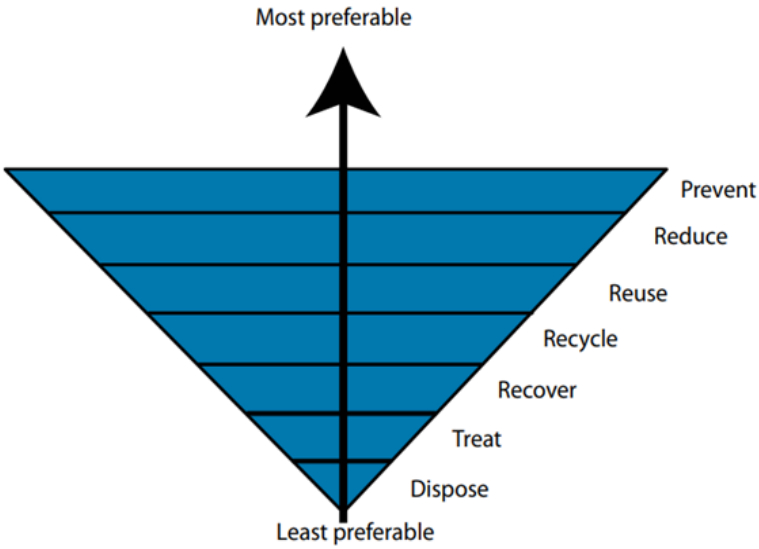
- Have a duty to manage waste safely
- Are legally and financially responsible for the safe handling and disposal of waste generated by them with minimal impact on the environment
- Must always assume that the waste is hazardous until shown to be safe
- Remain responsible for the waste from the point of generation until its final treatment and end-disposal

5.1 The waste-management hierarchy

Protecting the public through the management of waste can be achieved by a variety of methods. These can be summarised in an order of preference called the 'waste hierarchy', with the most desirable method at the top to the least desirable at the bottom **(Figure 25).** The waste-management hierarchy is based on the concept of the "3Rs", namely reduce, re-use and re-cycle, and relates to the sustainable use of resources. Best practice waste management will aim to avoid generation or recover as much of the waste as possible, rather than disposing of it by burning or burial.[127]

[126]Integrated Health Care Waste Management Plan (IHCWMP), 2012
[127]WHO. Safe management of waste from health-care activities, 2nd edition. 2014. https://www.who.int/publications/i/item/9789241548564

FIGURE 25: WASTE MANAGEMENT HIERARCHY



5.2 The waste management process

Waste should be segregated at the point of generation e.g., in the ward, OT or CSSD into the required category and discarded into the appropriate colour bag to reduce the amount of waste that must be treated and disposed of - the steps of the waste management process can be seen in **Figure 26**.[128]

FIGURE 26: WASTE MANAGEMENT PROCESS

The waste management process consists out of the following steps from generation to final disposal **(Table 23).**

Table 23: Waste management process

Step	Actions
Step 1: Waste minimisation or generation	Reduces the amount of hazardous waste that needs further treatment e.g., only use gloves and other PPEs if indicated
Step 2: Segregation	Can significantly reduce the amount of waste that requires treatment - segregate waste in the appropriate category at the point of generation.
Step 3: Collection	Close containers when 2/3 full
Step 4: Transport	Wear appropriate PPEs and transport in a dedicated closed trolley

[128] WHO. Safe management of waste from health-care activities, 2nd edition. 2014. https://www.who.int/publications/i/item/9789241548564

Step 5: Storage	Store non-hazardous and hazardous waste separately in a dedicated, closed area with controlled access
Step 6: Treatment	Treat waste appropriately according to available resources
Step 7: Final disposal	Will depend on the treatment option selected[129,130]

Safe treatment of waste generated during care activities is the responsibility of all staff

5.3 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.[131] A universal colour-coding system has been developed, which links a certain colour to a specific type of waste and therefor supporting appropriate disposal. There should be clearly visible posters (Appendix 8) 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 24** provides an overview of the colour coding system. [132]

Table 24: Colour codes of different types of waste

Type of Waste	Description	Colour Code	Requirements
Medical Waste (biohazardous or infectious waste)	Produced during diagnosis, treatment, and medical research	**Red 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 -
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 fluids	**Solid yellow container**	Yellow container or another sturdy box - clearly marked '"sharps" and ''biohazardous"
Biological (anatomical) waste	Includes pathological and biopsy specimens, tissue, organs that were removed during surgery, birth, or autopsy.	**Red plastic bag**	- Wrap in a plastic bag. - Place inside a red plastic bag and then into a sturdy container - Mark with ''biohazardous" sticker

[129]MoHSS. Performance audit report Medical Waste Management 2012 - 2015
[130]Slides from Dr Ute Pieper. Healthcare consultant.
[131]WHO. Safe management of waste from health-care activities, 2nd edition. 2014. https://www.who.int/publications/i/item/978924154856
[132]Integrated Health Care Waste Management Plan (IHCWMP), 2012

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"."	**Red plastic bag labelled "Chemo"**	Strong leakproof container marked "cytotoxic waste"
Pharmaceutical Waste	- Pharmaceuticals that have (but are not limited to) expired their shelf life in the pharmacy or returned by patients - This also includes medicines that no longer comply with the MoHSS 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 MoHSS	**No specific requirement**	- Placed in chemical resistant containers - Marked clearly as hazardous chemicals

Type of Waste	Description	Colour code	Requirements
Requirements	- Waste (bio-hazardous) that is contaminated with radio- isotopes and is produced during nuclear medicines, radio-immuno-assay and bacteriologic procedures. - 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 - Segregated according to physical form, solid and liquid and according to half-life or potency

Non-infectious or Nonnon-medical Wastewaste	- 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" Bottle, cans, paper, and cartons No additional container
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**	Clear plastic bag If not contaminated with food or other waste **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 must be disposed of as waste	**Yellow plastic bag**	

Figure 27 is a visual summary of the colour coding and waste management process. The poster can be found in Appendix 8.

FIGURE 27: COLOUR CODING AND SEGREGATION OF WASTE

5.3.1 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.

The container should have the following qualities:

- Be made of solid material
- Be designed to fall away from the body when lifted manually and have robust handles to ensure safe handling
- Have secure lids which do not open once fastened into place
- Be able to withstand hot water wash up to 90 degrees Celsius 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

5.3.2 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.[133,134] General healthcare waste should be temporarily stored separately from any other hazardous waste when it is disposed of 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
- No accessible to rodents, stray animals and the public or unauthorised 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[135,136,137]

FIGURE 28: EXAMPLES OF SIGNAGE FOR STORAGE FACILITIES [138]

Table 25 provides a summary of the duration and temperatures for the storage of HCRW prior to disposal and treatment.

[133] Integrated Health Care Waste Management Plan (IHCWMP), 2012
[134] MoHSS. Performance audit report Medical Waste Management 2012 - 2015
[135] WHO. Safe management of waste from health-care activities, 2nd edition. 2014. https://www.who.int/publications/i/item/9789241548564
[136] Integrated Health Care Waste Management Plan (IHCWMP), 2012
[137] MoHSS. Performance audit report Medical Waste Management 2012 - 2015
[138] WHO. Safe management of waste from health-care activities, 2nd edition. 2014. https://www.who.int/publications/i/item/9789241548564

Table 25: Storage period and temperature of HCRW

Waste category	Storage period	Storage temperature
Pathological waste	- 24 hours to 90 days from date of sealing - Pathological waste not treated with 24 hours must be stored at -2°C	-2°C
Infectious waste	- 24-72 hours - 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	Two days maximum	2 ˚C of stored >2 days
Non-clinical waste	When stored for longer periods	5 – 8 ˚C

5.3.3 Waste transportation

5.3.3.1 Internal transportation

- Once the waste has been segregated, the plastic bag should be tied when ¾ full, the containers labelled and stored in a clean dry room in the clinical area ready for collection. Storage in the sluice room is not recommended
- The waste should be collected every day from wards and consultation rooms. The waste should be transported in closed lockable containers/trolleys/carts which can hold the waste bags in place during collection and can be unloaded easily
- These transportation trolleys should be washed with detergent and water every day at the end of the collection cycle and allowed to dry
- No disinfectant is necessary unless spillage has occurred (see blood spillage)
- Clinical waste should be stored in a dry, secure space free from vermin, and protected from the elements, ready for collection (by in-house or private contractors)
- Non-clinical waste can either be stored or dropped directly into a compactor, which will reduce the bulk of the domestic waste before it goes to the land fill
- It is important that the appropriate PPEs are worn during handling and transportation of waste. (See section on waste handlers' safety).

5.3.3.2 External transportation

As the waste generator, the health facility is responsible for:

- Adequate labelling of HCRW to be transported off site
- Waste is exclusively transported by an accredited transporter who is registered
- Transporting waste via collection vehicles only - should be used to transport HCR and should be clearly marked, as well as lockable
- The vehicle should be cleaned after each delivery
- Ensure that clinical waste is transported safely in closed containers for final disposal
- Ensure that appropriate PPEs and spill kits are available

HCRW must be documented, and vehicles should carry a consignment note from the collection point and treatment facility. For more detail, consult the IHCWMP 2012.[139,140]

[139]Integrated Health Care Waste Management Plan (IHCWMP), 2012
[140]MoHSS. Performance audit report Medical Waste Management 2012 - 2015

5.3.4 Disposal of healthcare risk waste

HCRW are mostly incinerated in Namibia according to the IHCWMP 2012. **Table 26** provides an overview of what type of waste can be incinerated or not.

Table 26: Waste that can, or cannot be incinerated [141,142]

Waste that can be incinerated	Waste that cannot be incinerated
• Non-reusable PPEs • Laboratory spills • Non-reusable PPEs • Laboratory spills	• Pressurised gas containers • Polyvinyl Chloride (PVC) plastic • Glass vials • X-ray /photographic materials • Batteries • Waste with heavy metals, particularly mercury or cadmium

5.4 Waste treatment options

Treatment technologies should comply with national standards and international conventions including the Stockholm Convention and the Basel Convention, including the WHO policy paper on health care waste management (WHO 2004), recommendations and environmental and occupational safety considerations.

Table 27 indicate the recommended treatment and disposal methods for HCRW.[143,144,145]

Table 27: Treatment and disposal methods for HCRW

Treatment/ disposal method	Description of treatment/disposal	Examples of waste types
Shredding and Autoclaving (primary treatment technologies) Encapsulation	- Waste is shredded and sterilised using a dual process to convert healthcare waste into non-category, general waste, which can then be disposed using the regular waste disposal system - Waste is shredded and autoclaved using heat, steam, and pressure at an industrial autoclave where healthcare waste is processed	All waste except anatomical and pharmaceutical waste
Encapsulation	- Containment is used when there is no need to remove the waste material and/or the cost of its removal is prohibitive - The main purpose of containment is to prevent or control liquid or semi-liquid contaminated wastes from leaking or leaching into surrounding areas - Mainly recommended for hazardous liquid waste	Radioactive waste and highly toxic waste
Electrothermal deactivation	Non-burn treatment method	All categories of waste, except anatomical and pharmaceutical waste
Incineration (primary treatment technology)	- Waste treatment process that involves the combustion of organic substances contained in waste materials - Incineration and other high-temperature waste treatment systems are described as ''thermal treatment" - Incineration of waste material converts the waste into ash, flue gas and heat	All categories of waste

[141] Integrated Health Care Waste Management Plan (IHCWMP), 2012
[142] MoHSS. Performance audit report Medical Waste Management 2012 - 2015
[143] WHO. Overview of technologies for the treatment of infectious and sharp waste from healthcare facilities. 2019. https://apps.who.int/iris/handle/10665/328146
[144] WHO. Overview of technologies for the treatment of infectious and sharp waste from healthcare facilities. 2019. https://apps.who.int/iris/handle/10665/328146
[145] SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic

5.5 Waste handlers' safety

5.5.1 Personal protective equipment for waste handlers

- Heavy duty gloves
- Mask/goggles or face shield
- Long-sleeved gown/apron
- Closed shoes
- Depending on the task, a hard hat may be recommended[146]

Note: Perform hand hygiene immediately after removal of gloves

5.5.2 Vaccination

Waste handlers should be vaccinated against Hep B and Tetanus.[147]

[146] Slides from Dr Ute Pieper. Healthcare consultant.
[147] Integrated Health Care Waste Management Plan (IHCWMP), 2012

CHAPTER 6: SAFE HANDLING OF LINEN

Used linen may be heavily contaminated with blood and body fluids and a wide range of micro-organisms, including mites e.g., scabies and therefore should always be handled with care to prevent their dispersal or transfer.

Guidelines must be in place and followed to ensure the safe handling of linen to:

- Prevent clean linen from becoming contaminated before it is used in patient care
- Prevent dirty (used/soiled/infectious/infested) linen from contaminating patients, staff, the environment, and clean linen

6.1 Compliance to standards

To ensure compliance with the MOHSS Hospital Standards, healthcare facilities need to have the following in place: [148]

- A standard operating procedure for the management of linen including colour coding.
- Adequate resources to ensure effective laundering of linen, and suitable maintenance of the building and laundry equipment.
- ***A quality management system must be established, incorporating:***
  - ⇨ Work instructions and procedures
  - ⇨ Process control procedures
  - ⇨ Quality control procedures
  - ⇨ Control of linen (clean/soiled) procedures
- A procedure for the prevention of transmission of infections should be available to staff handling dirty linen.
- It should include control measures to differentiate between categories of dirty linen, containers, and colour-coded plastic bags as follows:
  - ⇨ **Category A: (Red plastic bag): Heavily soiled** linen (blood and body fluids) of patients with highly infectious diseases e.g., certain viral haemorrhagic fevers - sealed bag for immediate incineration
  - ⇨ **Category B: (Green plastic bag):** Sealed bag of high-risk/potentially infectious linen
  - ⇨ (Soiled linen, linen contaminated with blood and body fluids and linen of patients in isolation should be loaded directly into the washing machines
  - ⇨ **Category C: (Clear plastic bag):** Sealed bag of infested/potentially infested linen - a clear standard operating procedure (SOP) must be in place and communicated to all laundry staff [149]
- There needs to be a trained designated staff member for the control of laundry
- There must be adherence to the requirements regarding pollution, occupational and environmental hygiene
- Appropriate action should be taken when risks are identified that can lead to HAIs or outbreaks
- Procedures for the use of protective clothing and personal hygiene should be documented
- All staff must receive training on the use of PPEs[150]

6.2 Types of laundry

The safe handling of linen starts with the categorisation of used linen to ensure that each type of linen is treated appropriately in the laundry according to the degree of contamination. Laundry in the healthcare setting includes blankets, bed sheets, towels, gowns, patient clothing, scrub suits, mattresses, curtains, drapes, and other woven materials.

Laundry should be segregated into the respective category/s at ward level **(Table 28).**

[148]MOHSS Namibia, Hospital Standards 1st Edition. 2021
[149]SA NDoH. 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
[150]Mehtar, S., 2010. Understand Infection Prevention and Control. Juta & Company. Claremont, South Africa

Table 28: Categories of laundry

Category of laundry	Specification	Management
Used linen: dry dirty	Used linen that is not contaminated with body fluids and faeces	**- Cloth bag** - See laundry process
Used linen: wet soiled	Linen, contaminated with body fluids, vomit or excreta	**- Green plastic bag** - Wear appropriate PPEs
Infectious	Linen from patients with specific infections (in isolation) which is a potential source of infection to staff and other patients [151]	**- Green plastic bag** Wear appropriate PPE - Clearly marked as "infectious linen". - See laundry process
Infested linen	Linen from patients with scabies or lice (infested)	**- Clear plastic bag** - Clearly marked as "infested" - Wear appropriate PPE. - See laundry process
Highly infectious linen	Linen heavily contaminated with blood and body fluids that were in contact with patient with e.g., viral haemorrhagic fever (VHF) [152,153]	**- Red plastic bag** - For incineration or autoclaving if safe cleaning is not possible

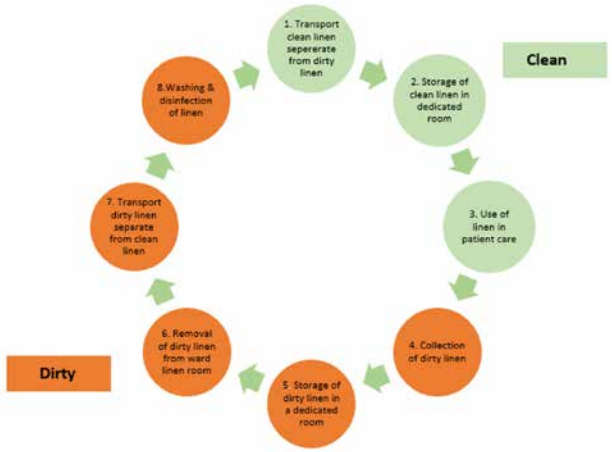
6.3 The laundry cycle

The movement of clean and dirty linen from the point of use to the processing area and back is shown in **Figure 29.** The orange and green sections denote used or dirty areas and clean areas respectively.

The laundry cycle consists out of the following steps: [154]

1. Transportation of clean linen separately from dirty linen
2. 2Store clean linen in a dedicated room for clean linen
3. Use linen appropriately in patient care area and sort according to level of contamination after use and place in colour coded bags
4. Store in closed bags that are labelled in a dedicated area for dirty linen. Do not store with clean linen
5. Transport dirty linen in closed containers from the wards to the laundry - soiled and wet linen should be placed in leak proof plastic bags
6. Never transport clean and dirty linen together
7. Linen should be washed according to the level of contamination **(Figure 29)**

FIGURE 29: THE LAUNDRY CYCLE



[151]Mehtar, S., 2010. Understand Infection Prevention and Control. Juta & Company. Claremont, South Africa
[152]Mehtar, S., 2010. Understand Infection Prevention and Control. Juta & Company. Claremont, South Africa
[153]WHO. 2014. Interim Infection Prevention and Control Guidance for Care of Patients with Suspected or Confirmed Filovirus Haemorrhagic Fever in Health-Care Settings, with Focus on Ebola
[154]SA NDoH. 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

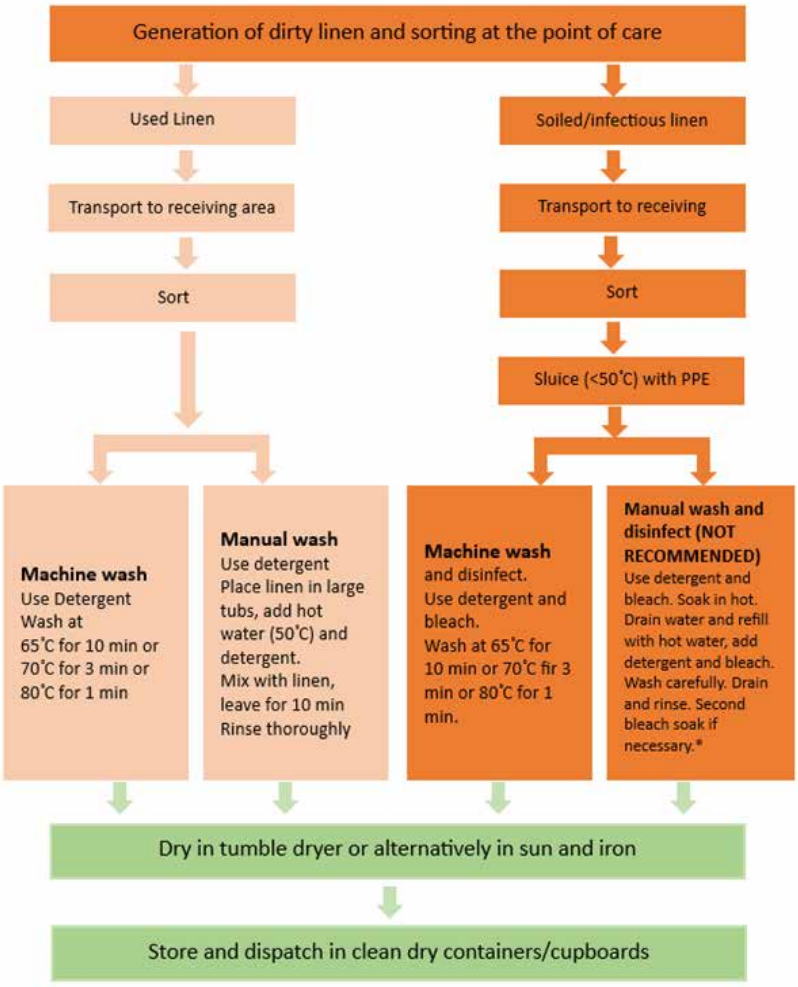
6.4 Laundering process

All healthcare linen, irrespective of where it is processed (in-house or outsourced), must go through a laundering process (Figure 30) that meets the following IPC standards:

Note:

- The **pre-wash (sluice) cycle should not exceed 50˚C.** This is to avoid coagulation of proteinaceous material on the linen
- Use an approved detergent and bleach in the correct concentrations
- Approved temperature and duration of the wash cycle as per manufacturer recommendation
- Washing of heat-sensitive patient clothing and uniforms at a temperature of no more than 40°C [155]

FIGURE 30: LINEN PROCESSING



6.4.1 Transportation and storage of clean linen

- Clean linen must be transported from the laundry to the user area in clean, closed **containers or clear plastic** bags
- Clean linen, pillows, duvets, and blankets must be stored on slatted shelves in a designated clean storage area (clean linen room or cupboard) that is kept closed **AND NOWHERE ELSE**
- When beds are being made, the clean linen that will be used must be stacked on a linen trolley and the trolley parked outside the patient room
- Clean linen must not be left on these trolleys since the linen will become contaminated in busy and open areas like the passages

[155] SA NDoH. 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

- To prevent contamination, linen should not be stored at floor level
- Perform hand hygiene before handling clean linen

6.4.2 Storage and transportation of dirty linen

- Dirty linen must be stored in closed bags in a designated area (dirty linen room) until it is collected from the unit/ward/clinic/OT to be taken to the laundry. The door of the dirty linen room must be kept closed and access to the room must be restricted.
- The storage period must not exceed 24 hours except over weekends.
- The frequency of collection of linen depends on the volume of laundry:
  - ⇨ Once a day in the mornings from the wards
  - ⇨ Three times a day from the trauma and labour ward
  - ⇨ Up to four times a day from the OTs
- Dirty linen must be transported to the laundry in closed containers.
- Linen handlers must wear heavy-duty rubber gloves for their protection and wash their hands after removal of the gloves.
- ***The service provider/laundry is responsible for:***
  - ⇨ Washing the reusable material linen bags
  - ⇨ Cleaning the linen trolleys on a regular basis
  - ⇨ Cleaning and disinfecting dirty linen transport containers and vehicle before loading with clean linen
  - ⇨ Cleaning up a spillage from the linen immediately
- **There must be no contact between clean and soiled linen at any time** [156]

6.4.3 Handling of dirty linen

Take the following steps to handle dirty linen safely:

- Wear gloves and a plastic apron when handling soiled, infectious, or infested linen - there is no need to wear gloves when handling used linen
- Move the dirty linen trolley to the patient bedside/examination table/operating table and transfer the linen directly from there into the bag on the trolley
- **Do not carry dirty linen to the dirty linen room or place it on the floor** or on the bedside table or other surfaces. The dirty linen will contaminate the staff clothing or the surfaces onto which it is placed
- Do not shake dirty linen
- Handle linen as little as possible to prevent the dispersal of skin scales carrying potentially harmful micro-organisms
  - ⇨ Roll the linen inwards to enclose the most contaminated areas
  - ⇨ Hold dirty linen away from the body to prevent contamination of the uniform/scrub suit
- First remove any solids such as faeces or vomitus and discard appropriately
- Choose the appropriate colour bag for different categories of linen
- All dirty linen bags must be labelled with the date and the ward/unit/clinic name
- Ensure that no additional items (used dressings, sticky tape, instruments) are placed into the linen bags and especially that no sharps inadvertently end up in the linen
- Perform hand hygiene after handling dirty linen, including when moving from one patient's bed to another when making beds

[156] SA NDoH. 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

No linen should be washed or sluiced in clinical areas
Patients should not be allowed to bring their own linen to health facilities

6.4.4 Handling of infested linen

In addition to measures mentioned above, wear gloves and plastic apron when handling infested linen: Place linen in clear plastic bag while at the bedside of the patient close and label the bag with the unit/health facility name and date), the following procedure must be followed:

- Put an additional label on the bag that states "infested linen"
- Put the closed bag in the sluice room and contact the pest control department to treat the linen
- The pest control department will treat the linen according to their standard operating procedure
- Request the housekeeper to send this linen to the laundry [157]

6.4.5 Frequency of changing bed linen and towels

6.4.5.1 Hospitals

The bed linen and towels of patients must be changed:

- Daily in critical care and high care areas
- Between patients and at regular intervals depending on whether the linen is soiled or every two to three days in the wards
- The bed linen and towels must be changed immediately when they become visibly soiled
- **Linen in isolation rooms must be changed more frequently to reduce the bioburden**

6.4.5.2 PHC facilities and EMS

Due to a high turnover of patients in PHC and EMS, a change of fresh bed linen between each patient is neither practical nor cost effective and most of these patients are dressed.

Two options are offered here:

- Use a linen saver/paper roll to cover the bed and discard after each patient - this may be expensive, but is practical, alleviates the need for laundry and might be more cost effective in the long run `
- Linen must be changed after being visibly contaminated
- Linen must be changed at the end of a shift and when visibly soiled
- Ensure the mattresses and covers are intact - wipe the mattress over with a damp cloth and detergent to remove all visible organic matter
- Once dry, wipe with an appropriate disinfectant or disinfectant wipe - if wipes are used, it needs to be done in a systematic manner with a constant supply of disinfectant wipes
- Mattresses that are visibly soiled should be cleaned with a detergent and water, and disinfected [158]

6.4.6 Special considerations

Table 29 provides an overview of the management of specific items.

[157] SA NDoH. 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
[158] SA NDoH. 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

Table 29: Special considerations

Item	Recommendation
Mattress covers	• Where available, protective mattress covers should be used • Treat dirty or soiled mattresses covers as any laundry • If dirty, put in ordinary cloth bag for dirty linen or if soiled with body fluids, put in a green plastic bag
Ripple mattress	• Cleaned with warm water and detergent • Wiped with 70% alcohol
Cotton drapes	• Woven or cotton drapes used in the OT are sent for laundry • The wash process will depend on the category of the linen e.g., wet, or dry ''used" linen • (Consult the Operating Room Manual 2nd Edition 2023)
Curtains	• Record must be kept of when window and bed curtains are changed • Window curtains must be changed every three months or immediately when they become visibly soiled • Inter-bed/privacy curtains are considered as part of the patient's linen, because they are handled often and can easily become contaminated • Change inter-bed curtains: ⇨ After discharge of an infectious patient ⇨ Every four weeks if the patient(s) are non-infectious ⇨ Immediately when they become visibly soiled [159]
Theatre linen	• Used OT laundry e.g., surgical gowns, should be segregated as any other laundry • Wet and soiled laundry should be placed in the green plastic bag whilst unsoiled dry dirty laundry should be placed in cloth bags • Laundry used during sterile procedures will be send to the laundry for washing and ironing, and then to the CSSD for packaging and sterilising

Note: Soiled mattresses should not be sent to the laundry but must be condemned and discarded

6.5 General guidelines for laundry management

- A clean-linen trolley should be designated and used only for storing and carrying clean linen
- These trolleys should be cleaned regularly, at least twice a week
- All linen including mattress covers, pillowcases and blankets should be removed for washing when a patient no longer needs to use the bed e.g., when discharged, deceased, or transferred
- Clean linen should always be provided to new admissions
- Mattress covers and linen savers should be used to protect linen from soiling with body fluids
- Avoid contaminating hands and self when removing soiled linen by using personal protective equipment (gloves and aprons)
- Linen should be handled with the minimum level of agitation e.g., when changing bed sheets, it should not be flailed/waived when taken off
- Adhere to the specific recommendations in cases of infectious disease management
- Laundry bags (cloth and green plastic bags) should not be overfilled and should be securely closed to prevent leakage and content from falling out
- **Never use linen, including dirty linen, to clean up spills**
- Linen should never be heaped up in linen or sluice room and be sorted out later
- **Do not stick needles into the mattresses**

[159]SA NDoH. 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

CHAPTER 7: ENVIRONMENTAL CLEANING

Environmental contamination plays an important role in the transmission of micro-organisms and is therefore an important intervention to prevent HAIs.[160] The environment at 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 reduce 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 using 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)[161] and Best Practices for Environmental Cleaning for Prevention and Control of Infections in all Healthcare Settings, 3rd edition. Toronto: Public Health Ontario; 2018.[162]

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

7.1 Objectives of an environmental cleaning programme

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

- Organisation/administration
- Staffing and training
- Infrastructure and supplies
- Policies and procedures
- Monitoring, feedback, and audit [163]

Figure 31 illustrates the environmental transmission pathway.

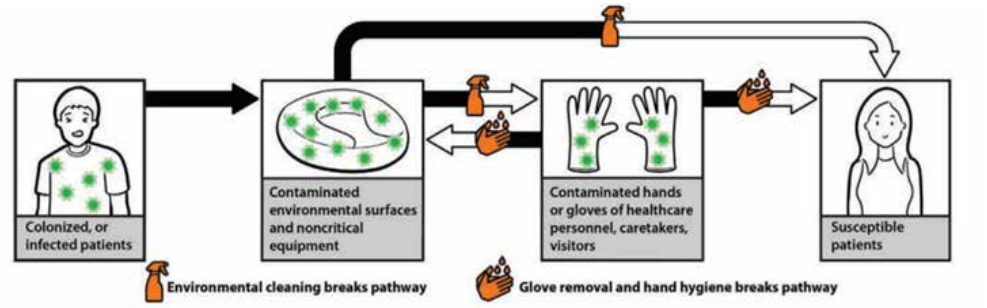
Micro-organisms are transferred from the environment to a susceptible host through:

- 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 micro-organisms around the environment. **Figure 31** 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. [164]

[160]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
[161]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
[162]Best practices for environmental cleaning for prevention and control of infections in all health care settings, 3rd edition. Toronto: Public Health Ontario; 2018 (https://www.publichealthontario.ca/en/health-topics/infection-prevention-control/environmental-cleaning).
[163]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
[164]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

FIGURE 31: TRANSMISSION PATHWAYS



7.2 Risk assessment in environmental cleaning

It is important to do a risk assessment when a decision is made regarding the frequency of environmental cleaning, as well as the priority for cleaning. The following must be taken into consideration:[165] **Table 30** explains the risk-based approach to environmental cleaning.

Table 30: 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).

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

Table 31 provides a recommendation of the frequency of cleaning based on a risk assessment of the area.[166]

Table 31: Recommendation of frequency of cleaning

Area	Frequency	Method	Additional Guidanceguidance
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)

7.3 Cleaning staff requirements

- 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 OTs, must adhere to the specified dress code for those areas

[165]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

[166]CDC Best Practices for Environmental Cleaning in Healthcare facilities in Resource Limited Settings Version 2. Available: https://www.cdc.gov/hai/pdfs/resource-limited/environmental-cleaning-RLS-H.pdf

- 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
  - ⇨ When hands potentially contaminated with blood/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[167]

Note: Staff working in HCFs must be adequately trained, and a record of the training must be kept - staff are responsible for familiarising themselves with the proper precautions required before entering specialised areas Personal Protective Equipmentprotective equipment for cleaning staff

7.4 Personal protective equipment for cleaning staff

Table 32: PPE for cleaners

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

[167] SA NDoH. 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

	**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 **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
	• **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
Domestic staff working in isolation wards or single isolation rooms must wear the appropriate PPEs according to the transmission-based precaution requirements and as guided by the nursing staff	
For domestic staff - it is within their rights to refuse to work in an infectious area if appropriate PPEs are not provided	

7.5 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 micro-organisms 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 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

7.6 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 33** provides a summary of cleaning methods.

Table 33: Cleaning methods

Recommended CleaningMethodscleaning methods	
	- 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[168]
	- 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
Not recommended: **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. **Sweeping:** Sweeping with brooms is not recommended for healthcare facilities since the individual bristles only displace the dust. See Table 35 for alternatives.	

7.7 Cleaning equipment

A colour-coding system[169] is recommended for cleaning equipment to reduce the risk of cross contamination in multiple areas **(Table 34).** The recommended cleaning equipment is set out in **Table 35**

Table 34: 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, baths, 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.[170]

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

[168] J Hosp Infect. 2009 Dec;73(4):378-85. doi: 10.1016/j.jhin.2009.03.030. Epub 2009 Sep 1. The role of environmental cleaning in the control of hospital-acquired infection. Dancer SJ1
[169] Rohde, R., 2016. Colour coding to prevent hospital infections. https://infectioncontrol.tips/2016/02/12/colour-coding-to-prevent-hospital-infections/
[170] SA NDoH. 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

Table 35: Cleaning equipment

Recommendations for cleaning equipment	
	- Colour coded mops - Flat mop systems are preferred, because 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 - 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 - Normal brooms with bristles should not be used in HCFs
	- A double bucket, colour-coded **- 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
	**- Domestic gloves** to provide protection from chemicals (See section on PPE)

	- **Floor polisher, scraper and buffer** for polishing of floors
	- **Window** squeegee for cleaning windows
	- **Duster** to remove dust from surfaces - can be washed and tumble dried No feather dusters should be used
	- **Pistol-grip spray container** - 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.g., milk bottles

7.7.1 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

7.8 Chemicals used in cleaning

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

7.8.1 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

7.8.2 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

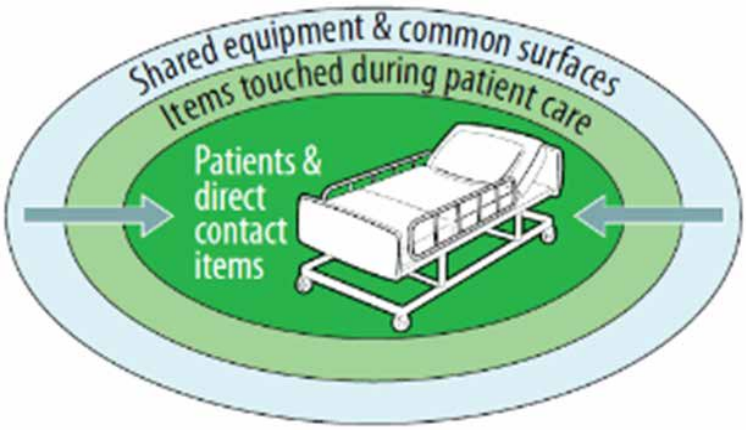
7.9 Order of cleaning

- 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 (**Figure 32**), 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 **(Figure 33)**[171]
- 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, and then air dried

FIGURE 32: FROM CLEAN TO DIRTY

[171]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

FIGURE 33: CLEAN FROM FAR TO NEAR



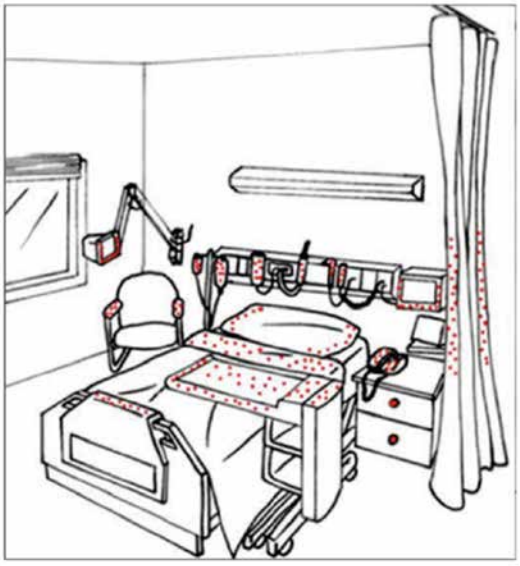
7.10 Type of cleaning

7.10.1 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 34** provides examples of high touch areas, indicated with a red dot.[172] Appendix 9 provides a SOP for cleaning.

FIGURE 34: HIGH TOUCH SURFACES



7.10.2 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 cleaning the designated area. Supervisors should co-sign the checklists daily after confirming that the areas were cleaned properly.

[172]Ontario Agency for Health Protection and Promotion (Public Health Ontario), Provincial Infectious Diseases Advisory Committee. Best practices for environmental cleaning for prevention and control of infections in all health care settings. 3rd ed. Toronto, ON: Queen's Printer for Ontario; 2018.https://www.publichealthontario.ca/-/media/documents/bp-environmental-cleaning.pdf?.

7.10.3 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.[173]
- **PHC and 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 (Section 7.12) [174,175]

[173]Mehtar et al. 2010. Understanding Infection Prevention and Control. Juta & Co. Claremont, South Africa.
[174]Ontario Agency for Health Protection and Promotion (Public Health Ontario), Provincial Infectious Diseases Advisory Committee. Best practices for environmental cleaning for prevention and control of infections in all health care settings. 3rd ed. Toronto, ON: Queen's Printer for Ontario; 2018.https://www.publichealthontario.ca/-/media/documents/bp-environmental-cleaning.pdf?..
[175]SA NDoH. 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

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.

7.11 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

7.12 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

7.13 Handling of Waste

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

7.14 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 11 discuss different types of pests and their control in more detail.

CHAPTER 8: ANTISEPTICS, DISINFECTANTS AND DETERGENTS

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.[176]

8.1 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 are able to remove 80-90% of all visible dirt from surfaces.

8.1.2 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.[177] 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.

8.1.3 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

8.1.1.1 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) [178]

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

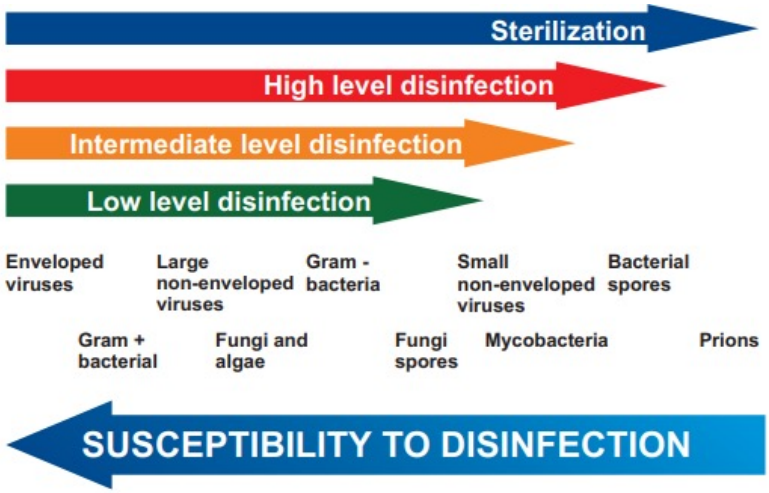
Note: Chlorhexidine-containing preparations must not be used for cleaning environmental surfaces, because it is expensive, wasteful, and being an antiseptic (and not a disinfectant), it has specific indications for use on skin

[176]SA NDoH. 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
[177]SA NDoH. 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
[178]SA NDoH. 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

8.1.4 Disinfectants

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 [179] **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 of 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 35.[180]

FIGURE 35: 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

8.1.4.1 Properties of disinfectants

Table 36 provides a list of disinfectants, spectrum of activity, stability and effect on medical devices.

Table 36: Properties of disinfectants

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

*NE= non enveloped viruses

[179]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
[180]SA NDoH. 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

8.1.4.2 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
- 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.

Table 37: Detergents and disinfectants for environmental cleaning

Uses	Agents	Comments
Low Risk Areasrisk areas		
• Corridors • All wards • Ablution blocks • Beds • Lockers • Floors • Surfaces • Mattresses	• Detergent and clean water	• Use clean, warm water with a neutral detergent • Apply with a clean cloth or mop (floors) until visibly clean, rinse and dry

High Risk Areas		
• Transplant units • Oncology units • OTs • ICU • Neonatal ICU • Trauma and emergency milk kitchen • Isolation rooms or wards • Sluice rooms • Mattresses in special units	• Clean with detergent and clean water AND • 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 • Alternatives should be considered in neonatal units. • Ensure to adhere to recommended contact times of different disinfectants • Consult IPC Team for use in terminal cleaning
Stainless steel surfaces, enamel baths and basins	• Detergent and clean water OR • 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 • Chlorine disinfectant (bleach)	• Wear appropriate PPE • Wipe away spillage with paper towels • Clean the area with water and detergent and dry • Wipe over with chlorine 1000ppm solution • •Dispose waste and PPE • Hand hygiene
Trolley surfaces	Detergent and clean water AND 70% alcohol	Wipe over with alcohol wipe at beginning and end of treatment or wound dressing (ensures dryness) [181]

- 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.**[182]

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.

8.2 Recommendations for Environmental Cleaning

Recommendations for the use of detergents and disinfectants for environmental cleaning stratified by risk are set out in **Table 37.**

[181]SA NDoH. 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
[182]SA NDoH. 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

8.3 Adverse Effect of Disinfectants on Users

Table 38 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.[183,184]

Table 38: Advantages and disadvantages of common healthcare 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: • May be used on food contact surfaces • Wide material compatibility • Non-corrosive Detergent properties, good cleaning ability Low cost	• Toxicity: • Skin irritant • Can also cause respiratory irritation • Narrow microbiocidal spectrum • Cannot be used to disinfect instruments. • **Diluted solutions may support growth of microorganisms.** • ***Affected by environmental factors:*** • Activity reduced by various materials (e.g., cotton, water hardness, microfibre, organic material) • Induces cross resistance with antibiotics • Persists in the environment and waterway
Intermediate-level Disinfectants	***Alcohols (60-80%) e.g., isopropyl, ethyl alcohol, methylated spirits***	• Broad spectrum (but not sporicidal) • Rapid action • Non-toxic • Non-staining, no residue • Non-corrosive • Low cost • Good for disinfecting small equipment or devices that can be immersed	• Slow acting against non- enveloped viruses • ***Does not remain wet:*** • Rapid evaporation making contact time compliance difficult (on large environmental surfaces) • ***Affected by environmental factors:*** • Inactivated by organic material. • ***Material compatibility:*** • May damage materials (plastic tubing, silicone, rubber, deteriorate glues) • Flammable

[183]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/

[184]SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic

	Chlorine ***e.g., bleach/sodium hypochlorite, sodium dichloroisocyanurate (NaDCC)***	• Broad spectrum (sporicidal) • Rapid action • Non-flammable • Low cost • Readily available • Can reduce biofilms (at high concentrations)	• Affected by environmental factors: • Inactivated by organic material • ***High toxicity:*** • Can release toxic chlorine if mixed with acids or ammonia • Skin and mucous membrane irritant • ***Material compatibility:*** • May damage fabrics, carpets • Corrosive • Leaves a residue, requires rinsing/ removal with a clean cloth • Offensive odours • ***Poor stability:*** • 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 • Harmful to the environment • No antiviral activity • Avoid in nurseries (reported hyperbilirubinaemia in infants) • To be avoided
High-Level disinfectant	Glutaraldehyde 2%	Broad range of microbial activity Effectively destroys bacteria, fungi and viruses	Takes long to destroy spores Allergenic Dangerous, toxic and irritant Maximum exposure time needed
	Hydrogen peroxide (improved formulation) ***e.g., 0.5% enhanced action formulation hydrogen peroxide, 3% hydrogen peroxide***	• Rapid action • Non-toxic • Detergent properties, good cleaning ability • Not affected by environmental factors • Active in the presence of organic material • Safe for environment	• ***Material compatibility:*** Contraindicated for use on copper, brass, zinc, aluminium
	Peracetic acid 0.2 to 0.35%	Broad range of microbial activity Poor sporicidal activity Generally rapid No odour	Expensive Skin and eye irritant Unstable when activated Stains items and skin if not thoroughly removed. Hypersensitivity reactions Monitor for efficacy levels
	Peroxide compounds (7.5%)	Cold sterilisation of heat sensitive items No activation No odour Eco-friendly	Material compatibility concerns with metals such as brass, copper, zinc, etc [185,186]

[185]Mehtar, S., 2010. Understanding Infection Prevention and Control. Juta & Company. Claremont, South Africa
[186]SA NDoH. 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

8.4 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 39 and Appendix 12 (illustrations) for instructions on how to re-constitute hypochlorite and the application of the different strengths in HCFs.[187]

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 39: Instructions to reconstitute hypochlorite

Product	2% Solution	1% Solution	0.2% Solution	0.05% Solution
Calcium Hypochlorite (HTH) 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 0.5 soupspoon in 10 litres of water
NaDCC At 1g active chlorine per tablet	20 tablets in 1 litre of water	10 tablets in 1 litre of water	2 Two tablets in 1 one litre of water	5 tablets in 10 litres of water
Chlorinated lime At 30% active chlorine	60 grams in 1 litre of water or 4 level soupspoons in 1 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 litres
Sodium hypochlorite (bleach) At 5% active chlorine	400 ml of bleach in 1 litre of water	2250 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
Sodium hypochlorite concentrate 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 1 litre of water	3.3 ml of 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 a good condition).

Table 40 provides information about the indications for the use of different strengths of chlorine solution.[188]

Table 40: 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	10001,000 ppm
Catering and infant feed equipment	125 ppm
Hydrotherapy pools	4-6 ppm

[187]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

[188]SA NDoH. 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

Drinking water	0.5-1.0 ppm[189]
Cholera	10001,000 ppm (depending on the activity)
VHF	10001,000 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 41 provides more examples of different strengths of chorine, the use and recommended contact time.

Table 41: 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	**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

8.5 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

8.6 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

[189]SA NDoH. 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

- 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**

CHAPTER 9: DECONTAMINATION OF MEDICAL DEVICES

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.[190]

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.

9.1 Decontamination of medical devices

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

9.1.1 Level of decontamination

The WHO Decontamination Guideline (2016)[191] clearly outlines and emphasises the need for optimal cleaning, disinfection and sterilization of reprocessed medical devices that are used for patient care. **Table 42** provides an overview of the levels of decontamination and description of each.

Table 42: 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 micro-organisms as well as the dirt, thereby improving contact with the surface being disinfected or sterilised, 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 micro-organisms. Cleaning is the removal of contamination from an item to the extent necessary for further processing or for its intended re-use
Disinfection	Disinfection refers to the destruction or removal of micro-organisms 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	Sterilisation refers to a validated process that renders a medical device free from micro-organisms. It is the complete destruction or removal of micro-organisms, including bacterial spores[192]

9.2 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 43).**[193]

[190]WHO. Health Policy and Standards. Available. https://www.who.int/teams/health-product-policy-and-standards/assistive-and-medical-technology/medical-devices
[191]World Health Organization. Decontamination and Reprocessing of Medical Devices for Health-care Facilities. Geneva; 2016. http://www.who.int/infection-prevention/publications/decontamination/en/
[192]SA NDoH. 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
[193]Rowan, N.J., Kremer, T., McDonnell, G. A review of Spaulding's classification system for effective cleaning, disinfection and sterilization of reusable medical devices: Viewed through a modern-day lens that will inform and enable future sustainability. Science of The Total Environment Vol 878, 20 June 2023. https://www.sciencedirect.com/science/article/pii/S0048969723015942?via%3Dihub

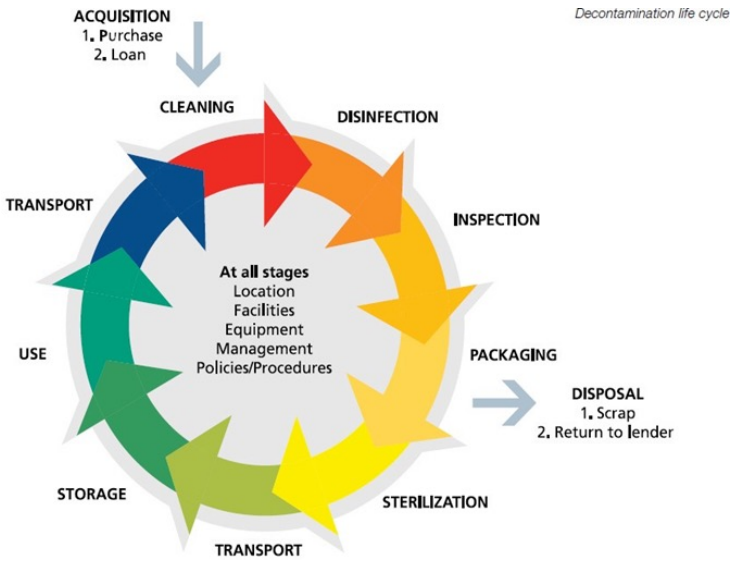
Table 43: Spaulding's classification

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 sterilisation 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, sterilisation. 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[194]

9.3 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 36). The cycle starts when dirty medical devices are brought to the CSSD, then cleaned, disinfected, inspected, packed, sterilised, transported, stored, used, and transported back to the CSSD.[195]

FIGURE 36: DECONTAMINATION LIFE CYCLE.



For further guidance on effective decontamination and reprocessing of medical devices, refer to MoHSS Central Sterile Services Department (CSSD) Guidelines 2nd Edition 2023 and the Decontamination and Reprocessing of Medical Devices for Health Facilities (WHO).[196]

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:

[194]SA NDoH. 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
[195]World Health Organisation. 2016. Decontamination and reprocessing of medical devices for health-care facilities. Available; https://www.who.int/publications/i/item/9789241549851
[196]World Health Organisation. 2016. Decontamination and reprocessing of medical devices for health-care facilities. Available; https://www.who.int/publications/i/item/9789241549851

9.3.1 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.

9.3.2 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.

9.3.3 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.

9.3.4 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 **(Table 44).**

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.[197]

Table 44: Cleaning agents and general recommendations

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

[197]SA NDoH. 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

9.3.5 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.

9.3.6 Sterilization

There are several methods of sterilization **(Table 45)** 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[198]

Table 45: Methods of Sterilization

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

9.3.7 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.

9.4 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 46** provides a summary of the properties, antimicrobial activity and toxic effect of some of the disinfectants available on the market.[199,200]

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.[201]

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.

[198]SA NDoH. 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
[199]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/
[200]SA NDoH. 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
[201]SA NDoH. 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

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.[102]

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 46: Disinfectants: properties, antimicrobial activity and toxic effect

Disinfectant	Spectrum	Stability	Inactivation	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
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

9.5 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)

[202]SA NDoH. 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

- 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

9.6 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[203]

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.

Table 47 provides an overview of the decontamination required for different types of medical devices.

For more information about the decontamination of medical devices consult the MoHSS Central Sterile Services Department Guidelines 2nd Edition 2023.

[203] SA NDoH. 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

Table 47: 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 must be done at the CSSD and not at ward level		
Airways and endotracheal tubes[1]	Single use, OR Heat disinfection at 80o C	Use disposable for airborne diseases if heat sterilisation not available
Ambubags[1]	Send to CSSD for heat disinfection	Ethylene oxide. Do - 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 a burns patient.	Antiseptics become colonised with gram-negative bacilli.
Baths	Clean with detergent and non-abrasive cream cleanser. Rinse - rinse and dry.	Infected patients. As - as in previous column. Wipe - wipe over with chlorine-based agent after cleaning. Do and do not soak.
Bed and cots	Wipe with warm water and detergent to remove all visible signs of dust and dirty. Dry, then dry	Ensure the cot is dry after cleaning and before putting back the mattress.
Bed frames	Wipe with warm water and detergent.Dry and dry	NO disinfectants required routinely
Bed locker	Wipe with warm water and detergent.Dry., then dry and Cleanclean inside locker once patient has been discharged	NO disinfectants required routinely
Bedpans and urinals	Wear nonsterile gloves. Empty and empty contents directly into Wardward washer, disinfector (80oC x1 min).Inspect) - inspect for cleanliness after removal.Clean, clean if necessary and store inverted to dry.	• Macerators with paper mâché 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 • NEVER SOAK BEDPANS
Blankets and bed covers	Changed after each patient has been discharged or when visibly soiled. Send - send to laundry to wash at 80oC.	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 • 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 • 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 and dry • Enteric disease - Wipe the commode with -hypochlorite (1,000 ppm av Cl2) after each use
Computer and keyboards	• Damp dust daily • Wipe keyboard carefully to remove visible dirt	Use a keyboard cover which is changed frequently
Crockery and cutlery	• Wash at 80oC in dishwasher • Manual Cleaning: wear gloves and hand wash in detergent and hot water (60oC), rinse and dry	• Wear domestic gloves for manual cleaning • Infected patients: unless instructed by IPC team • treat as routine. Disposable crockery is rarely indicated
Curtains	• Change curtains routinely every 4 weeks. • Isolation room curtains (infectious cases) should be changed with each terminal clean unless visibly soil	Blinds, both vertical and horizontal are difficult to clean and wash regularly and gather dust, they should therefore 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 and dry Wipe over with 70-80% ethanol alcohol Discard all previous contents of open jars and bottles Replace with unopened containers	If open jars are used, keep the volume small so that the containers can be heat disinfected when empty **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 CATHETERS**

Feeding bottles (baby)	Heat sterilised 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
Humidifiers1	• Empty daily and heat disinfect after each patient use • Clean with warm water and detergent and 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 Cl2) • Leave incubator to stand unused for 6 hours (aeration)
Instruments (surgical)	To CSSD	
Kitchen cloths	Daily: wash in detergent and dry	Disposable preferable.
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 • Never use soiled, stained, or damaged mattress • If rubber covers are uncomfortable, cover with absorbable paper which is frequently changed	Major source of cross infection Ideally mattresses should have two covers - the bottom one should be impermeable and the top one should be removable and washable. 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 • ***Manual cleaning:*** Wear rubber glove and rinse thoroughly in 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 • 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.
Nebulisers[1]	• Wash and dry the container and mask after each patient use • Store dry and protected from dust	
Oxygen masks[1]	Disposable	• If reusable: wash thoroughly until visibly clean or use heat disinfection (CSSD) and dry 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, 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 • Shaving is not recommended
Sheepskin	***Synthetic:*** laundry ***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 • ***Liquid:*** wall mounted dispenser containers, single use sachets, OR • Must be sent for thorough cleaning and heat disinfection if recycled and refilled under aseptic conditions	Tablet soaps are not recommended **NEVER TOP UP** - this increases the risk of GNB colonisation
Shower head	• Should be removed and cleaned thoroughly each week • Soak in de-scaler 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 • Disposable preferred, OR • Send tubing to CSSD for sterilisation • Clean the surface and cover after each use	• PPE: non-sterile gloves and apron • Never leave fluid (secretions or disinfectant) in the reservoir if not in use
Surfaces and ledges	Damp dusting daily.Dry. and dry	
Thermometer (oral) Electronic	• Wash and dry after each patient use • Wipe with 70% alcohol and store dry • 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 • 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 • ***Other***: wash with detergent rinse and dry • Wipe with alcohol	• Do not share toys in an infected ward • Heavily soiled toys may have to be destroyed
Respiratory tubing[1]	• Disposable • Reprocessed in CSSD	NNEVER 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- machines2	• These are complex and should be cleaned and disinfected according to manufacturer's instruction • Sometimes there are technicians in the HCF who do the maintenance • These persons should be trained	• Remove tubing and send for heat disinfection to CSSD (80oC x 3 min) or ETO • Clean all connections. • Change both sets of filters • Check efficiency of air movement • Reassemble • 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 • Wash and clean outer cover, dry and replace bag • Check if valves and connectors are clean and functioning	Send for heat disinfection after each patient use.
X-Ray equipment	• Damp dust only • Wipe X-Ray film holders with alcohol between each patient	Wipe with 70% alcohol if disinfection required.

*Open containers are a high-risk area for transmission from hands of staff and contamination from the environment and should be avoided.

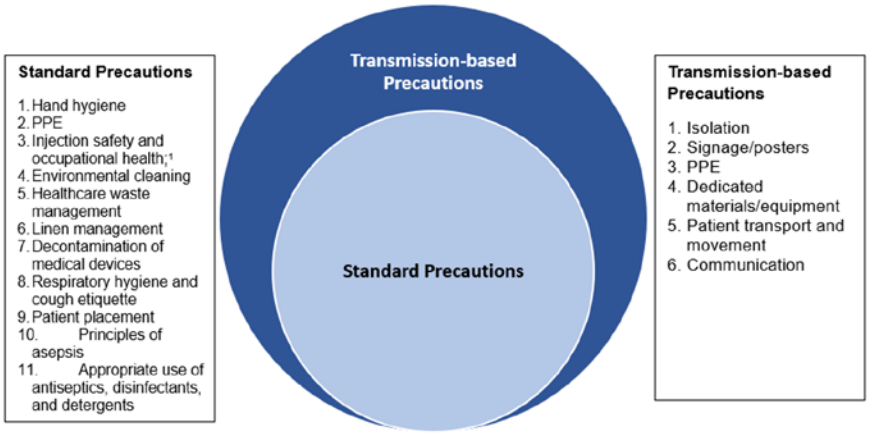
[1] Respiratory equipment ideally should be disposable (risk of TB). If re-used, then ensure the items are sent to the CSSD for automated processing and heat disinfection. Soaking of respiratory equipment at ward level is unacceptable.2 Ventilators should be protected with internal and external filters and cleaned after patient use.

CHAPTER 10: TRANSMISSION-BASED PRECAUTIONS

This section addresses specific procedures which will reduce the transmission of pathogens between health workers and patients and visa versa. The first IPC precaution is triage, risk assessment and isolation of patients if indicated while applying Standard Precautions (SP). SP aim to protect both health workers and patients by reducing the risk of transmission of micro-organisms from both recognized and unrecognized sources. Transmission-based Precautions (TBP) are implemented in addition to SP and depends on the route(s) of transmission of micro-organisms,[204] SP have been extensively covered in Chapter 4.

Note: Transmission-based precautions should be applied in addition to Standard Precautions and is based on the specific route of transmission of a micro-organism.

FIGURE 37: TRANSMISSION-BASED PRECAUTIONS



10.1 Indications for Transmission-based precautions

Transmission-based precautions should be applied:

- For patients who are suspected or have a confirmed infection with a highly transmissible pathogen
- When the pathogen is considered epidemiologically important
- When medical interventions increase the risk of transmission of a specific infectious agent
- When the clinical situation prevents the systematic application of standard precautions

There may be more than one route of transmission and precautions must reflect all possible routes that can occur.[205] Ideally TBP follow a particular protocol to ensure staff and patient safety. It requires taking the following in consideration: patient placement, PPE, ventilation, linen management and procedures for dealing with infective patients

- Where possible, visible colour coded signs are displayed to remind staff of the potential risk of transmission
- Consult the IPC team if unsure about the type of TBP to implement
- Apply precautions based on risks of transmission from procedures and clinical conditions for all such conditions or patients
- **THERE ARE NO EXCEPTIONS!**

[204]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
[205]SA NDoH. 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

10.2 Categories of Transmission-based precautions

10.2.1 Contact precautions

- Direct contact e.g., the hands of health workers
- Indirect contact, via the environment and contaminated equipment

10.2.2 Respiratory precautions

Microbes are released in droplets or droplet nuclei (aerosols) when coughing or sneezing (respiratory tract activity). However, recent evidence suggests that this distinction is less clear when a cloud of different sized particles are expelled during coughing, sneezing, singing or shouting. Dilution and reduction in transmission from this cloud is dependent on good ventilation in addition to the appropriate TBP. Currently IPC precautions are as follows. Precautions related to the respiratory route of transmission are generally divided into:

- Airborne precautions for small particles (aerosols) e.g.,TB
- Droplet precautions for larger particles e.g., *N. meningitidis*

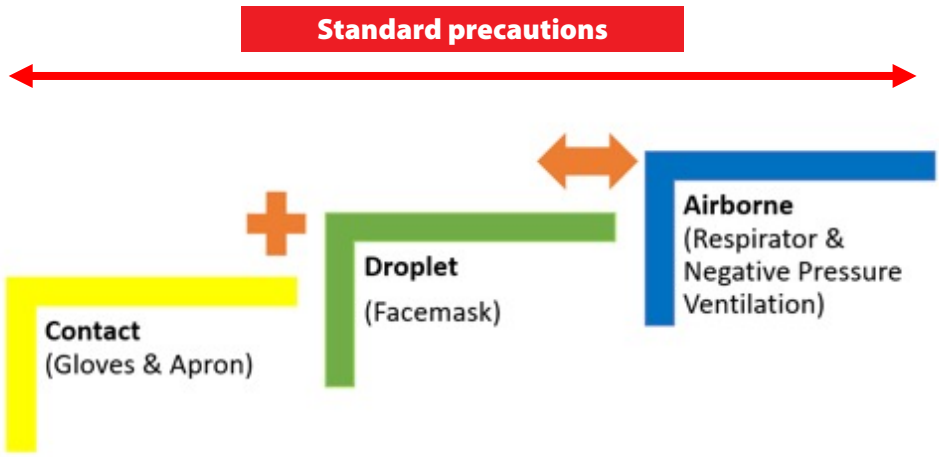
All health workers and visitors entering isolation rooms must wear appropriate PPE.

10.3 Risk Assessment

TBP is based on a risk assessment. ***Figure 35 outlines the principles and additional precautions necessary for TBP. In summary:***

- Contact: protect hands and clothes
- Droplet: protect mucous membranes from droplets and fluid exposure
- Airborne: remove airborne particles using negative pressure ventilation and respirators[206]

FIGURE 38: ADDITIONAL IPC PRACTICES FOR TRANSMISSION-BASED PRECAUTIONS



Note: Standard precautions, including meticulous hand hygiene applies to all.

A sign should be placed on the door of patient areas where TBP are in place, to remind staff of the precautions they need to apply. If the patient has to be nursed in an open ward, the sign should be placed at the head of the patient's bed or where it is visible to everyone approaching the patient. All signs must be removed after the patient has been discharged and terminal cleaning has been completed.

[206] SA NDoH. 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

10.4 Contact Precautions

Contact precautions must be applied when caring for patients with suspected or confirmed infections or colonisation with microbes transmitted by direct or indirect contact.

Table 48 provides the requirements for Contact Precautions.[207, 208, 209, 210,211]

Table 48: Recommendations for contact precautions

Clinical conditions	Medical devices and procedures
• ***Healthcare-associated pathogens:*** • Multidrug resistant pathogens such as: Methicillin resistant Staphylococcus aureus (MRSA) • Acinetobacter spp and other Gram negative bacilli • ESBL-producing Klebsiella pneumoniae and other Gram negative bacilli • Vancomycin-resistant enterococci (VRE) • Clostridium difficile • Diarrhoeal disease and gastro-enteritis: • Salmonella associated • Shigella associated • Viral causes such as rotavirus, norovirus Viral hepatitis such as hepatitis A and E • Enteric diseases • Typhoid Paratyphoid • Cholera • Blood borne viruses • Vector borne diseases • Viral haemorrhagic fevers (usually combined with Droplet Precautions)	Medical devices (inoculation) Hepatitis B and C - acute phase and if patient bleeding • HIV infected - acute phase and if patient bleeding • Infestations such as scabies or lice ***Procedures:*** Handling and carrying bedpans and urinals • Wound care on patients with extensive wounds • Bathing the patient with broken skin (skin lesions) • Internal examinations such as vaginal or rectal
Patient placement	
• Place patient preferably in single room with en-suite facilities or cohort patients with the same micro-organisms/diseases • If no isolation facility is available, initiate bed space isolation: place patient approximately two meters apart from next patient • If dedicated toileting facilities are not possible, consider assigning a toilet or use a bed pan/ commode. • Put up isolation sign: Contact precautions • Place clean, unused PPE outside patient room/ isolation area • Clinical notes should stay outside the patient room/zone • Minimal stock to be place in isolation rooms to prevent contamination and wastage • Keep the door to the room closed	
Hand hygiene	
• Perform HH according to WHO's 5 Moments of Hand hygiene • HH must be performed before donning and after removal of PPE	

[207]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
[208]Preventing transmission of infectious agents in paediatric in-patients haematology-oncology settings: what is the role of non- pharmacological prophylaxis? http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3103128/
[209]Mehtar, S. 2010. Understanding infection prevention and control. Juta and Company Ltd. Claremont
[210]Nulens, E., 2018. International Society for Infectious Diseases. Guide to infection control in the hospital. https://www.isid.org/wp- content/uploads/2018/07/ISID_InfectionGuide_Chapter7.pdf
[211]Munoz-Price, L.S., Banach, D.B., Bearman, G., Gould, J.M., Leekha, S., Morgan, D.J., Palmore, T.N., Rupp, M.E., Weber, D.J., Wiemken, T.L., Isolation Precaution for Visitors. July 2015. Vol 36 (7)

Personal protective equipment

Aprons:

Worn to reduce contact exposure from the patient and patient environment:

- Do not leave the room (or patient zone) while wearing the apron
- Discard into HCRW waste container in the isolation area after each use
- Never re-use aprons

Gloves (keep a box of gloves inside the isolation room - discard box when patient is discharged)

- Don gloves before entering the isolation room
- Apply a fresh pair of gloves after contact with the patient
- Change gloves where applicable based on the indications to perform HH
- Always perform HH before donning and after removal of gloves

Maintenance of a clean environment

Concurrent cleaning:

- Wear appropriate PPE
- Use dedicated cleaning equipment (yellow cloth and bucket)
- Clean all surfaces daily with detergent and water and then disinfect using 70% alcohol or hypochlorite solution (1:1000 ppm)

Terminal cleaning:

- Remove bed linen and privacy/inter-bed curtains and place in yellow bag and send to the laundry
- Clean all surfaces, including walls to hand height with soap and water and then disinfect using 70% alcohol or hypochlorite solution (1:1000 ppm)
- Upon discharge clean and disinfect all equipment in either the room or in the sluice before
- taking it to the storage area.
- Remove PPE and perform HH after completion of the task

Patient care equipment

- **Dedicated equipment is preferred.**
- Ideally use disposable equipment (if possible), such as stethoscopes, blood pressure cuffs and thermometers. Should disposable equipment not be available then decontamination procedures in accordance with standard operating procedures should be applied to the equipment used for infectious patients. The room should be cleaned thoroughly and disinfected daily. All linen, including bed curtains, should be removed for laundering after discharge
- Using equipment between patients poses a risk of transmission
- Any shared equipment is to be cleaned with a detergent and water and disinfected (e.g., disposable detergent disinfectant-impregnated wipes/ 70% alcohol or hypochlorite) after each use

Management of used linen

Treat all linen as contaminated and infectious:

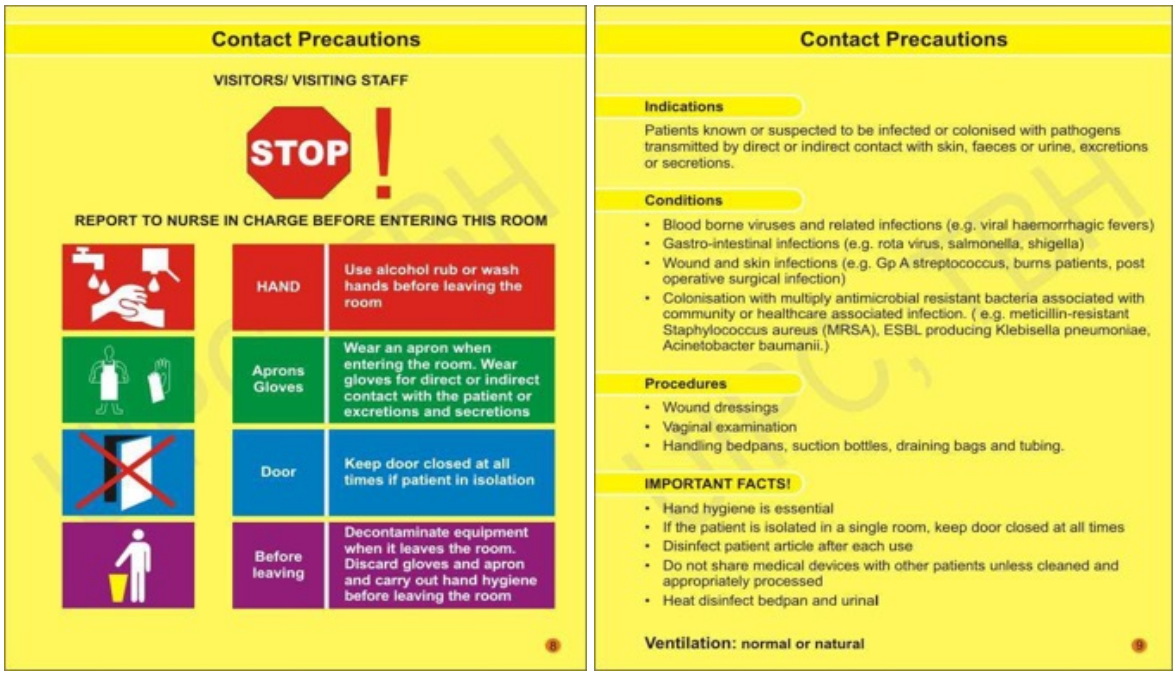
- Place in green plastic bag inside room, seal and place in linen bag dedicated for contaminated/infected linen in the sluice
- Ensure prompt removal
- Double bag if a leakage hazard exists and ensure safe transportation
- Attach list of contents to outside of bag

Catering
• Ensure that catering staff wear adequate PPE when entering the isolation room. Meal delivery and removal of trays must be done by nursing personnel • ***Crockery and cutlery:*** • Wash in an automated dishwasher • If manually cleaned wash in hot water (>55°C) and detergent and leave to air dry **Disposable crockery and cutlery are only indicated for specific conditions transmitted via saliva/secretions e.g., rabies, viral haemorrhagic fevers**
Patient transport
Limit movement outside of room: • Precautions should be maintained when patient leaves the room • Inform receiving department in advance of the infectious status of the patient and maintain precautions • Inform the theatre if the patient is scheduled for surgery • Inform EMS when there is an interfacility transfer, as well as the receiving health facility
Visitors
Visitors should: • Always announce themselves to the person in charge of the unit • Be informed of the reason for isolation • Adhere to the prescribed PPE • Perform HH before entering and after leaving the room
Duration of isolation and transmission-based precautions
• Precautions to be maintained for the duration of stay or until there are confirmed negative specimens, where applicable • Decision to be made in collaboration with the IPC Practitioner/team and the clinical team

10.4.1 Signage for Contact Precautions

A contact precaution sign **(Figure 39)** should be placed on the door to remind staff of the precautions they need to apply. Putting up the signage is the responsibility of the nurse in charge of the ward. She will manage the traffic in and out of the room.

FIGURE 39: CONTACT PRECAUTIONS SIGNAGE



10.5 Respiratory Precautions: Droplet Precautions

Droplet precautions are intended to reduce transmission by large particle droplets that may come into contact with mucous membranes or eyes of a susceptible person. Dispersion occurs during coughing, sneezing, talking. Large droplets settle quickly at approximately 1 m from the source, however fine sprays, that may travel further may contain infectious droplets. The environmental contamination is also to be considered in the early stage of a disease before the patient has been treated *(see Table 53 Communicable Disease)*.

Microbes transmitted by the droplet route include influenza, SARS-CoV-2 and other respiratory viruses, mumps, rubella, and Neisseria meningitides. Some viruses and bacteria may survive outside the body in the presence of mucous, serum and organic matter.

Transmission from large droplets requires close contact (approximately 1 m) with the source, or through risk-prone procedures causing aerosolization and splashes.

Risk-prone procedures for droplet transmission in hospitals include:

- Coughing up or inducing sputum production for laboratory tests; collecting of throat swabs
- Endotracheal suctioning (open and closed) of ventilated patients
- Chest physiotherapy
- Taking chest X-Rays from patients who are coughing
- Bronchoscopy
- Re-use of ventilator circuits and respiratory equipment
- Washing and cleaning of respiratory ventilation equipment in clinical areas without adequate knowledge or protection

In addition to SP, there are specific guidelines that must be followed as set out in **Table 49.** [212,213,214,215, 216]

Table 49: Recommendations for droplet precautions

Clinical Condition	Procedures
• Meningococcal meningitis (Neisseria meningitidis) • Haemophilus influenzae - epiglottis • Rubella (German measles • Influenza (all types) • Severe Acute Respiratory Syndrome (SARS) • Mumps • Diphtheria • Pneumonic plague • Viral Haemorrhagic Fevers (Droplet Precautions in addition to Contact Precautions) if the patient is bleeding into the respiratory tract. Some viruses and bacteria may survive outside the body in the presence of mucous, serum and organic matter	• Endotracheal intubation • Endotracheal suctioning (open and closed) of ventilated patients • Bronchoscopy • Chest Physiotherapy • Naso-gastric intubation • Taking chest X-Rays from patients who are coughing, especially with poor cough etiquette • Coughing up or inducing sputum production for laboratory tests; collecting of throat swabs • Insertion and removal of chest drain • Re-use of ventilator circuits and respiratory equipment • Washing and cleaning respiratory ventilation equipment in clinical areas without adequate knowledge or protection • Conducting postmortem

[212]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
[213]Preventing transmission of infectious agents in paediatric in-patients haematology-oncology settings: what is the role of non- pharmacological prophylaxis? www.ncbi.nlm.nih.gov/pmc/articles/PMC3103128/
[214]Mehtar, S. 2010. Understanding infection prevention and control. Juta and Company Ltd. Claremont
[215]Nulens, E., 2018. International Society for Infectious Diseases. Guide to infection control in the hospital. https://www.isid.org/wp- content/uploads/2018/07/ISID_InfectionGuide_Chapter7.pdf
[216] Munoz-Price, L.S., Banach, D.B., Bearman, G., Gould, J.M., Leekha, S., Morgan, D.J., Palmore, T.N., Rupp, M.E., Weber, D.J., Wiemken, T.L., Isolation Precaution for Visitors. July 2015. Vol 36 (7)

Patient placement
• Place patient in single room with en-suite bathroom • Preferably keep door closed • Cohort patients with same diagnosis or micro-organism • If no isolation facility is available, place patient at least two meters apart from the next patient, ideally near an open window • Put up isolation sign: Droplet precautions • Place clean, unused PPE outside patient room • Clinical notes should stay outside patient area
Hand hygiene
• Perform HH according to the 5 Moments of HH • HH must be performed before donning and after removal of PPE
Personal protective equipment
• Surgical mask is to be worn before entering the patient room • Surgical masks are single-use items and must be discarded in the HCRW container after removal, just before leaving the isolation area
Personal protective equipment
• Replace damp, soiled or contaminated masks immediately • Perform HH after removal
Maintenance of a clean environment
Concurrent cleaning • Wear appropriate PPE • Use dedicated cleaning equipment (yellow cloth and bucket) • Clean all surfaces daily with detergent and water and then disinfect using 70% alcohol or hypochlorite solution (1000 ppm) **Terminal cleaning** • Remove bed linen and privacy/inter-bed curtains and place in green bag and send to the laundry. • Upon discharge clean and disinfect all equipment in either the room, or in the sluice before taking it to the storage area • Clean all surfaces, including walls to hand height with soap and water and then disinfect using 70% alcohol or hypochlorite solution (1000 ppm) • Remove PPE and perform HH after completion of the task
Patient care equipment
• Dedicated equipment is preferred • Using equipment between patients poses a risk of transmission • Clean shared equipment (e.g., mobile vital signs monitor, thermometer, etc.) after patient use with a detergent and water and then disinfect (e.g., disposable detergent disinfectant-impregnated wipes/ 70% alcohol or hypochlorite)
Management of used linen
Treat all linen as contaminated and infectious • Place in green plastic bag inside room, seal and place in linen bag dedicated for contaminated/infected linen in the sluice • Ensure prompt removal • Double bag if a **leakage hazard** exists and ensure safe transportation • Attach list of contents to outside of bag

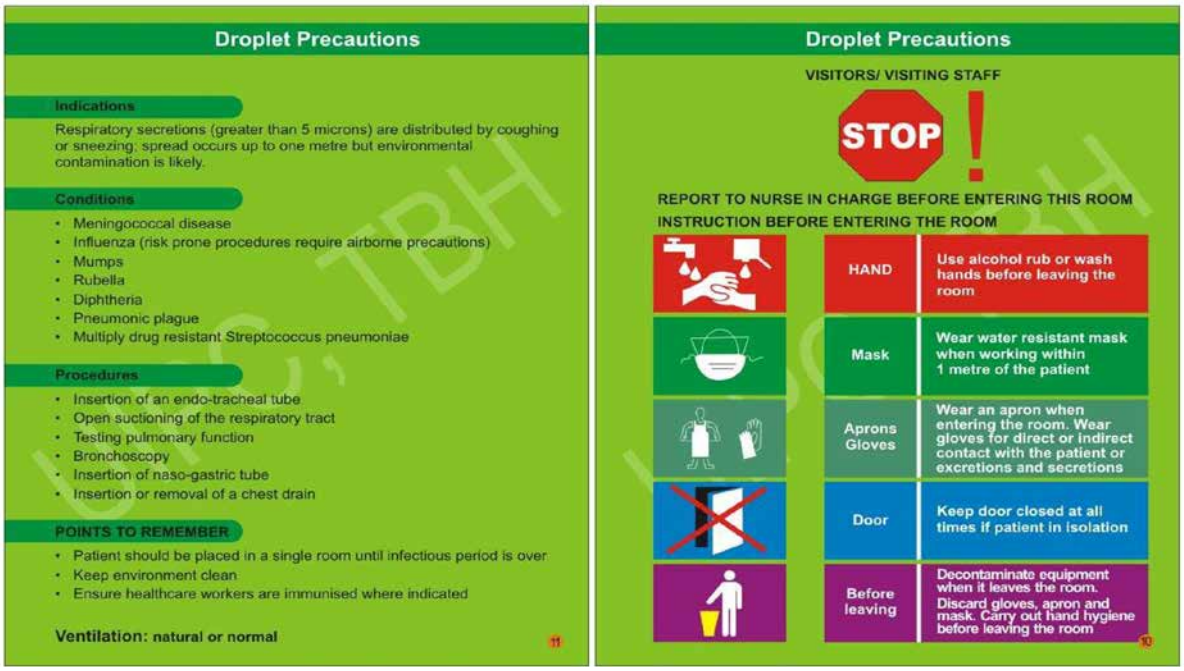
Catering
• Ensure that catering staff wear adequate PPE when entering an isolation room • Meal orders, delivery and removal of trays must be performed by nursing personnel • ***Crockery and cutlery:*** ⇨ Wash in an automated dishwasher ⇨ If manually cleaned wash in hot water (>55°C) and detergent and leave to air dry Disposable crockery and cutlery are only indicated for specific conditions transmitted via saliva/secretions e.g., rabies, viral haemorrhagic fevers
Patient transport
• Limit movement outside of room • Patient should wear a surgical mask when leaving the room for another department • Inform receiving department in advance of the infectious status of the patient and maintain precautions. • Inform the theatre if the patient is scheduled for surgery • The patients must be last on the theatre list to ensure for adequate cleaning/disinfection and ventilation of the environment Theatre staff must wear respirators if patient has infections such as influenza, SARS or TB
Visitors
Visitors should: • Always announce themselves to the person in charge of the unit • Be informed of the reason for isolation • Be restricted. Preferably no children, immune-compromised visitors or those not previously exposed as a close contact of the patient • Adhere to the prescribed PPE • Wear a **surgical mask** before entering • Perform HH before and after leaving the room
Discontinue isolation precautions
• According to diagnosis and infectious period for the condition, immuno-competence and clinical improvement of patient • Decision made in collaboration with the IPC practitioner/team and clinical team

Note: The use of N95 respirators or similar is indicated when performing high risk procedures in cases of SARS and influenza.

10.5.1 Signage for Droplet Precautions

A **"Droplet Precautions"** sign **(see Figure 40)** should be place on the door to remind staff of the precautions they need to apply.

FIGURE 40 : SIGNAGE FOR DROPLET PRECAUTIONS



Bear in mind that more than one type of TBP may be required based on risk assessment and the type of pathogen and condition, such as during an outbreak. Advice from the IPC team is recommended.

10.6 Respiratory Precautions: Airborne Precautions

Airborne Precautions are required when dealing with patients with known or suspected infection caused by pathogens transmitted via inhalation of very small particles which remain suspended in air for a long time. Susceptible persons are at risk if exposed at or closer than 3 m from the source of infection. Airborne pathogens can be transmitted via aerosols and air currents, which are greatly reduced with good ventilation.

Diseases spread by airborne pathogens include: [217]

- Measles
- Varicella (chickenpox)
- Pulmonary Tuberculosis (PTB), including extra-pulmonary TB related to the respiratory tract (pleura, trachea, etc.)

Patients with extra-pulmonary TB (e.g., TB bone) do not require isolation if PTB has been excluded.

Recently, studies demonstrated that the cloud exhaled from an infected person with SARS CoV 2 has varying sizes of aerosols, from large to small. Therefore, SARS CoV is considered an opportunist airborne pathogen.[218]

Negative pressure ventilation is required for isolating patients diagnosed or suspected of being infected with the above organisms and should provide no less than 6 air changes per hour (ACH).[219] Ideally, a private negative pressure isolation room with en-suite ablution facilities should be utilised. In the absence of negative pressure ventilation and in out-patient settings or primary healthcare clinics, open the window and place a fan, facing the open window to direct the airflow towards the open window and to reduce the microbial burden in the environment. This should achieve around 6-12 ACH. All health workers entering the room of a patient with suspected or confirmed tuberculosis should wear a fit- tested respirator or equivalent (see section on PPE). If TB patients are accommodated in an open ward due to lack of isolation facilities, the patient should always wear a surgical mask.

In addition to SP there are specific guidelines that must be followed as set out in **Table 50**. [220,221,222,223,224]

[217] ??????????????
[218]National Department of Health,COVID-19 IPC Guidelines, V3; 2021
[219]WHO. Roadmap to and ensure good indoor ventilation in the context of COVID-19. 2021. Available: https://www.who.int/publications/i/item/9789240021280
[220], 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
[221]Preventing transmission of infectious agents in paediatric in-patients haematology-oncology settings: what is the role of non- pharmacological prophylaxis? http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3103128/
[222]Mehtar, S. 2010. Understanding infection prevention and control. Juta and Company Ltd. Claremont
[223]Nulens, E., 2018. International Society for Infectious Diseases. Guide to infection control in the hospital. https://www.isid.org/wp- content/uploads/2018/07/ISID_InfectionGuide_Chapter7.pdf
[224]Munoz-Price, L.S., Banach, D.B., Bearman, G., Gould, J.M., Leekha, S., Morgan, D.J., Palmore, T.N., Rupp, M.E., Weber, D.J., Wiemken, T.L., Isolation Precaution for Visitors. July 2015. Vol 36

Table 50: Guidelines for airborne precautions

Clinical conditions requiring	Procedures
Pulmonary tuberculosis Measles Chicken pox	• Endotracheal intubation • Open suctioning of endotracheal sites • Bronchoscopy • Physiotherapy • Nasogastric intubation • Insertion and removal of chest drain. • Conduction of a postmortem especially on the thorax
Patient placement	
• Place patient in single room with en-suite bathroom • Patient must be accommodated in a room with negative pressure ventilation where available or in a room with open windows if possible • Always keep the door closed • Cohort patients with same diagnosis or micro-organism • Put up isolation sign: Airborne precautions • Place clean, unused PPE outside patient room • Clinical notes should stay outside patient area	
Hand hygiene	
• Perform HH according to the 5 Moments of HH • HH must be performed before donning and after removal of PPE	
Personal protective equipment	
• All staff wearing respirators must have undergone a fit test to ensure that the correct size • respirator is used to provide optimal protection • N95 respirators are to be donned before entering the patient room • Always perform a facial seal check after donning the respirator, prior to entering • Never share N95 respirators • The N95 respirator can be used for the duration of one shift or until damp, contaminated or deformed. • Replace damp, soiled, contaminated or damaged respirators immediately • Remove respirator after exiting the patient room and either store individual respirators in a marked paper bag outside the isolation room or discard in health care risk waste container • Perform HH after removal • If a respirator does not fit properly, it is unsafe, even though it may provide a false sense of • security • A respirator should not be worn by a patient whilst in isolation or during transportation outside the room. A surgical mask is adequate • Limit visitors • respirators should not be worn by visitors. A surgical mask is adequate • Wear gloves when in contact with the patient's secretions	

Maintenance of a clean environment
Concurrent cleaning • Wear appropriate PPE. • Use dedicated cleaning equipment (yellow cloth and bucket) • Clean all surfaces daily with detergent and water and then disinfect using 70% alcohol or hypochlorite solution (1000 ppm) **Terminal cleaning** • Remove bed linen and privacy/inter-bed curtains and place in yellow bag and send to the laundry. • Clean and disinfect all specialised equipment which will not remain in the room prior to removal to the equipment storage area • Clean all surfaces, including walls to hand height with detergent and water and then disinfect using 70% alcohol or hypochlorite solution (1:1000 ppm) • Remove PPE and perform HH after completion of the task
Patient care equipment
• Dedicated equipment is preferred • Using equipment between patients poses a risk of transmission • Clean shared equipment (e.g., mobile vital signs monitor, thermometer, etc.) after patient use with a detergent and water and then disinfect (e.g., disposable detergent disinfectant-impregnated wipes/ 70% alcohol or hypochlorite)
Management of used linen
Treat all linen as contaminated and infectious • Place in green plastic bag inside room, seal and place in linen bag dedicated for contaminated/infected linen in the sluice • Ensure prompt removal • Double bag if a leakage hazard exists and ensure safe transportation • Attach list of contents to outside of bag
Catering
• Ensure that catering staff wear adequate PPE when entering the isolation room Meal orders, delivery and removal of trays must be performed by nursing personnel • ***Crockery and cutlery:*** ⇨ Wash in an automated dishwasher ⇨ If manually cleaned wash in hot water (>55°C) and detergent and leave to air dry • Disposable crockery and cutlery are only indicated for specific conditions transmitted via saliva/secretions e.g., rabies, viral haemorrhagic fevers
Patient transport
• Limit movement outside of room • Patient should wear surgical mask when leaving the room for another department or share common patient areas such as shared bathrooms • Provide a surgical mask for coughing patients when they are transported in ambulances • Inform receiving department in advance of the infectious status of the patient and maintain precautions • Inform the theatre if the patient is scheduled for surgery. Theatre staff must wear respirators

Visitors
• Always announce themselves to the person in charge of the unit • Inform visitors of the reason for isolation • Restrict visitors. Preferably no children, immune-compromised visitors or those not previously exposed as a close contact of the patient • Visitors should adhere to the prescribed PPE • Visitors to wear a surgical mask before entering (N95 respirators are not recommended for • visitors unless they have had a fit test performed) • Perform HH before and after leaving the room
Discontinue isolation precautions
• According to diagnosis, immune status and clinical improvement of the patient • Incubation period of the disease • A minimum isolation period of 2 weeks on effective treatment for sensitive PTB • MDR and XDR-PTB must stay in isolation until transfer to a suitable facility as soon as possible or until two negative sputum specimens • Decision made in collaboration with the IPC Practitioner/team and clinical team
Specimens
In addition to SP • In the case of a patient with confirmed or suspected PTB, sputum should never be collected. • in a room shared with other patients or in a communal bathroom • Always stand behind the patient while sputum is collected or if patient needs assistance. • Wear appropriate PPE • Ensure that the ventilation is adequate in the area where sputum is collected

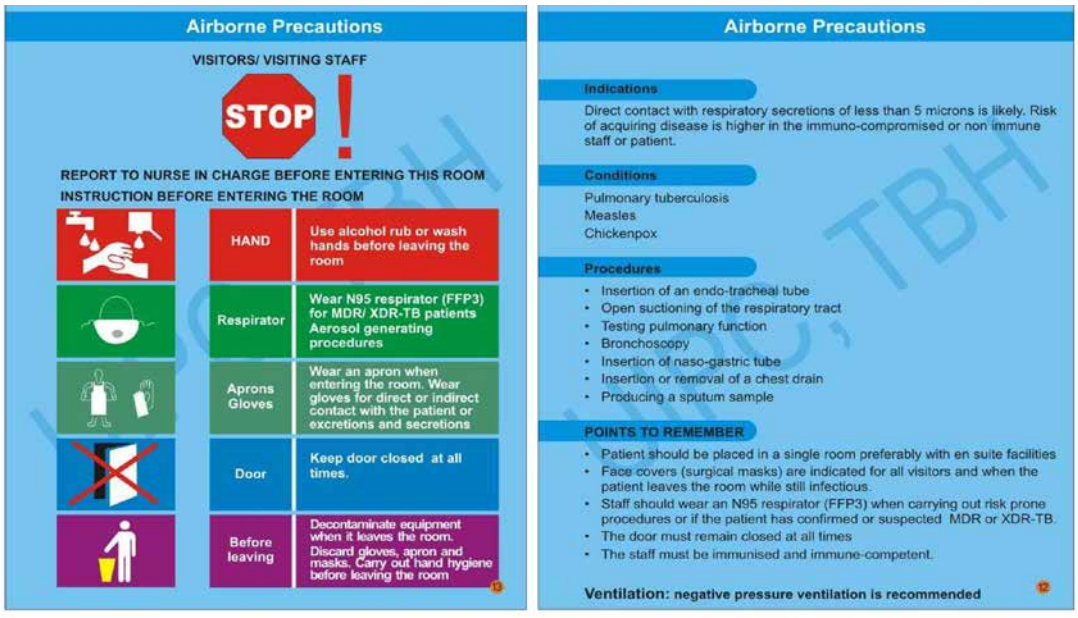
Ambulance and allied healthcare staff: a face mask is recommended when moving or transporting known or suspected infectious patients, and when carrying out risk prone procedures.

Immunisation of contact persons. It is recommended that all staff and visitors should be immunised (if a vaccine is available e.g., measles, COVID-19) or immune before entering the isolation rooms.

10.6.1 Signage for Airborne Precautions

An "**Airborne precautions**" sign **(see Figure 41)** should be placed on the door to remind staff of the precautions to be applied.

FIGURE 41: SIGNAGE FOR AIRBORNE PRECAUTIONS



10.7 Protective Isolation

Protective isolation is not part of TBP but is necessary to protect severely immune-compromised patients such as those with bone-marrow transplants. Immuno compromised patients require a clean but not necessarily a sterile environment, careful handling by well-informed health workers to reduce transmission. It is recommended that specialised units which usually deal only with these medical entities should cater for such patients. **Table 51** provides a summary of the management of patients in protective isolation.

Table 51: Protective isolation requirements

Types of patients	• Patients who are immune-suppressed due to chemotherapy e g., cancer or bone marrow suppression or patients who need organ transplants
Risk Assessment	• All procedures should be carefully considered and performed • Strict adherence to IPC principles is required by everybody entering the room to prevent transmission of pathogens • Health workers must be well trained on how to work with these patients and in IPC principles • Prevent construction and renovations in areas accommodating these patients due to the risk of airborne transmission of fungal spores
Environment	• **PROTECTIVE ISOLATION** posters should be placed on the door • A single room is preferred with separate ventilation (usually neutral pressure) and ensuite toilet and bathroom • The door should always remain closed • Ensure that facilities for hand hygiene is available • Sharps container next to the patient's bed
Protection of the patient	• Entry is restricted to essential health workers and close family. • Visitors will follow the same procedure as health workers
Equipment and PPE	• Trolley with all the items needed should be placed INSIDE the room and should be clean and dry • DO NOT share equipment between patients • PPE should be placed INSIDE the room if there is no anteroom • Clinical Notes should be kept OUTSIDE the room • Clinical waste containers will be placed OUTSIDE the room
Invasive devices	• All invasive procedures must be done aseptically with strict adherence to IPC principles
Health workers	• Dedicated nursing should be considered • Health workers should be well-trained • Adhere to aseptic procedures • Perform hand hygiene BEFORE and after patient contact
Environmental Cleaning	• The room should be free of dust, particulate matter, and skin scales • Use a dedicated clean mop and bucket or clean these rooms first • Wear appropriate PPE • Only take essential items into the room • When damp dusting the patient's bed, make sure that there is minimum contact with the patient and equipment
Management of linen	• Linen should be changed with minimum disturbance and aerosol generation • Remove soiled linen by rolling rather than pulling the sheets off the bed • Wipe down mattress with soap and water and allow to dry • Place fresh linen gently on the bed and unfold. DO NOT snap or wave the bed sheets to straighten them • Remove used linen and place in a linen bag

CHAPTER 11: COMMUNICABLE DISEASES & REPORTING OF NOTIFIABLE MEDICAL CONDITIONS

Notifiable medical conditions (NMC) are those diseases that are important to public health because they pose significant risks that can result in disease outbreaks or epidemics with high fatality rates. These diseases have to be reported to the required authorities[225] and the International Health Regulations (IHR).[226] by every healthcare provider in Namibia to break the cycle of transmission.

This section provides a summary of the reporting system and the IPC practices required to reduce the transmission of communicable diseases in HCFs and at home, and to ensure the safety of the patients and health workers.

11.1 The notification procedure

11.1.1 Importance of notification

- International Health Regulations (IHR)[227] and the MoHSS IDSR[228] require rapid detection, notification and prompt risk assessment of public health risks to enable timely and targeted public health response.
- Notifications serve as early warning signs for possible outbreaks hence enable efficient public health actions to contain or prevent such outbreaks.
- Notifications provide empirical data required to monitor disease distribution and trends and identify populations at risk, and for policy decisions.

11.1.2 Who should notify a Notifiable Medical Condition (NMC)?

Every doctor or nurse (health worker who diagnoses a patient with any one of the NMC.

11.1.3 Notification Process

Figure 42 provides an overview of the notification process.

[225] MoHSS National Technical Guidelines for Integrated Disease Surveillance and Response. 3rd Edition. 2023
[226] International Health Regulations (IHR 2005), https://www.who.int/publications/i/item/9789241580410
[227] International Health Regulations (IHR 2005), https://www.who.int/publications/i/item/9789241580410
[228] MoHSS National Technical Guidelines for Integrated Disease Surveillance and Response. 3rd Edition. 2023

FIGURE 42: NOTIFICATION PROCESS

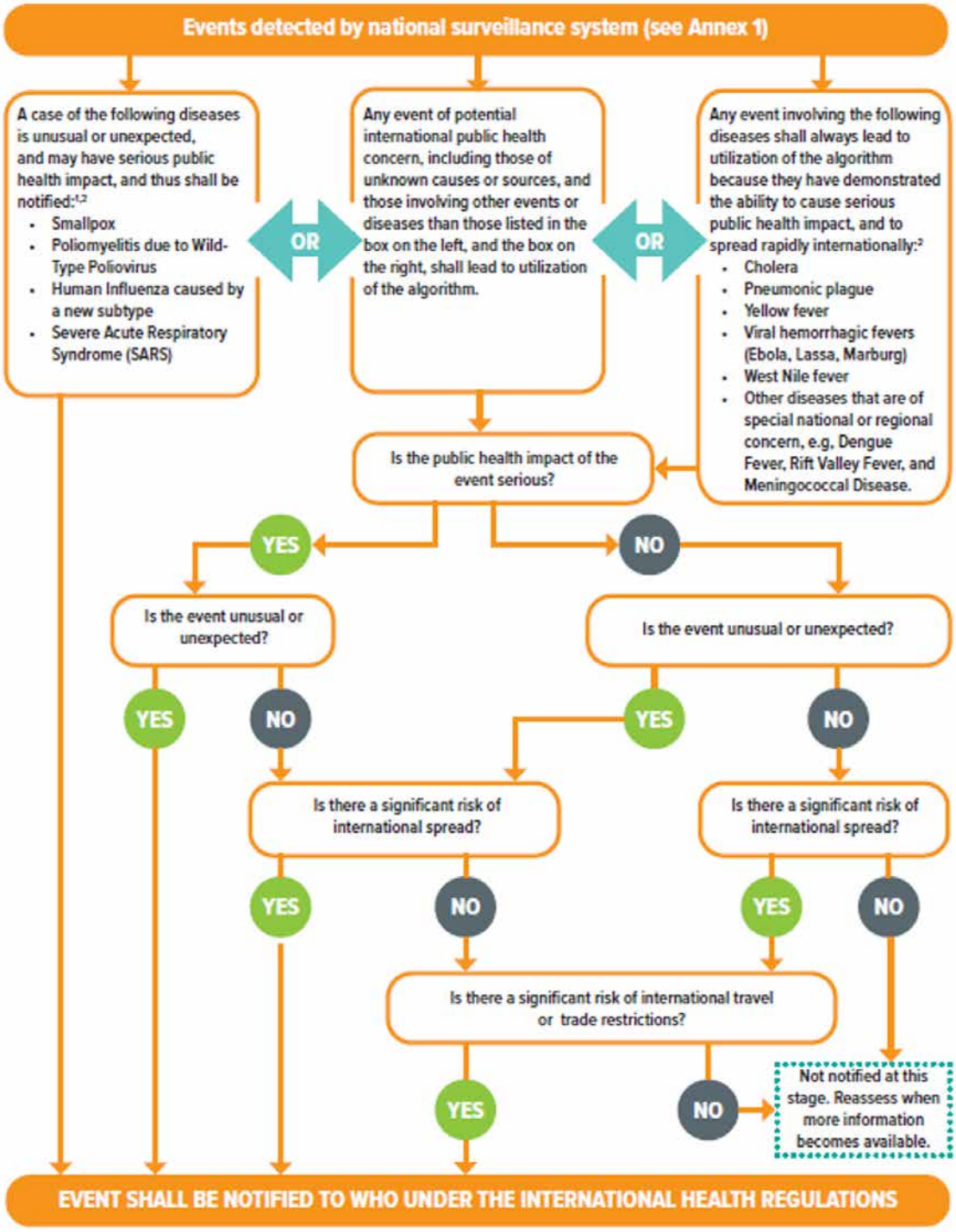


Table 52 provides an overview of the different medical conditions that must be notified. [229]

Table 52: Notifiable Medical conditions

Epidemic prone diseases, conditions or events	Diseases targeted for eradication or elimination	Other major diseases, events or conditions of public health importance
Acute Haemorrhagic Fever Syndrome	Bacterial Meningitis	Acute Jaundice Syndrome
Anthrax	Dracunculiasis (Guinea Worm)	Adverse Drug Resistance
Bacterial Meningitis	Leprosy	Adverse Events Following Immunisation (AEFI)
Cholera	Lymphatic Filariasis	Antimicrobial Resistance
Diarrhoea with blood (Shigella)	Malaria	Diabetes Mellitus (new cases)
Smallpox	Measles/Rubella	Diarrhoea with dehydration < 5 years of age
Plague	Neonatal Tetanus	Epilepsy
SARI/ /ILI**	Poliomyelitis***	Human Rabies
Typhoid Fever	Trachoma	HIV/AIDS (new cases)
Yellow Fever		Hypertension (new cases)
Also: A cluster of deaths in the community (animal or human deaths)	***Immediate notification	Injuries (Road traffic accideents0
A cluster of unwell people or animals with similar symptoms		Malaria
*Ebola, Marburg, Rift Valley, Lassa, Crimean Congo, West Nile Fever, Dengue		Malnutrition in children <5 years of age
		Maternal/Perinatal Deaths
		Non-neonatal Tetanus
		Scabies
		Snake bites
		Severe Pneumonia <5 years old
		STI's
		Schistosomiasis
		Soil Transmitted Helminths
		Trachoma
		Trypanosomiasis
		Tuberculosis (new cases)
		MDR/ /XDR Tuberculosis
Diseases or events of international concern: Human influenza due to a new subtype*** SARS*** Smallpox***	Zika Virus Disease Yellow Fever Any public health event of international or national concern (infectious, zoonotic, foodborne, chemical, radio nuclear, or due to unknown condition.)	

[229] MoHSS National Technical Guidelines for Integrated Disease Surveillance and Response. 3rd Edition. 2023

11.2 Communicable diseases

Not all notifiable medical conditions are communicable and not all communicable diseases are notifiable. Table 53 provides an overview of some important communicable diseases, their incubation periods and precautions to be implemented to prevent transmission. See Appendix 13 for a SOP about the management of a patient with a viral haemorrhagic fever.

For IPC purposes and when organising interventions whether at home or in a HCF, all communicable diseases are classified according to their route of transmission. This is a simpler method of containing such pathogens and allows the health worker to function within policies they are already familiar with. It is important that the necessary TBP are implemented when treating patients with communicable diseases. See Chapter 10 for details on TBP.

11.3 Handling of deceased bodies with infectious diseases

Patients with known infectious diseases should be handled with care after death. Some diseases can be transmitted during handling of the bodies e.g.,

- Tuberculosis can be acquired if the bacillus is aerosolized – residual air in lungs exhaled, fluid from lungs spurted up through the nose or mouth during handling of the corpse.
- Bloodborne viruses can be transmitted via direct contact of non-intact skin or mucous membrane from splashing of blood or body fluid or from injury from bone fragments and needles.
- Gastrointestinal (GI) infections can easily be transmitted from faeces leaked from dead bodies. Transmission occurs via the faecal–oral route through direct contact with the body, soiled clothes or contaminated equipment. [230]

11.3.1 Preparing the body to be transported to the mortuary

- Always first do a risk assessment to establish the risk of exposure or transmission of pathogens /infectious diseases.
- Selection op PPE will depend on the risk of exposure and the infectious agent.
- Removal of medical devices might increase the risk of exposure to body fluids.
- If an unnatural death is suspected, DO NOT REMOVE ANY MEDICAL DEVICES.
- Seal all draining wounds and orifices with waterproof dressings.
- Use cotton wool or gauze and carefully wipe away all visible signs of blood and body fluid using soap and water (or a disinfectant if recommended).
- In the case of cholera, the body should be washed and then disinfected with a 2% chlorine solution; and all orifices should be plugged with a cloth soaked in a 2% chlorine solution. Intestines should not be emptied.[231]
- Discard all the used cotton wool and gauze in a red bag.
- Place a notification of death on the chest clearly marked "INFECTIOUS".
- Attach an identification tag or wrist band which can be clearly visible from inside a transparent bag. If the body bag is not transparent, place another tag on the outside of the bag.
- Place body in plastic bag and seal. Then place the bag inside a second body bag and seal.
- Wipe the outside of the second body bag with a hypochlorite solution. The strength will depend on the disease and the infectious agent.

11.3.2 Transportation of the body to the mortuary

- Wear appropriate PPE even if the body is well sealed.
- ***If leakage does occur during transportation, deliver the body and clean and disinfect the trolley in the***

[230] WHO. Risks posed by dead bodies after disasters. Available: https://www.who.int/publications/m/item/risks-posed-by-dead-bodies-after-disasters
[231] 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

following manner:

- ⇨ Wear appropriate PPE
- ⇨ Clean the surfaces first with water and detergent
- ⇨ Dry the surfaces
- ⇨ Wipe the surfaces with hypochlorite. The strength will depend on the infectious agent
- ⇨ Place a sign saying "infectious" on the door of the refrigerator
- ⇨ In highly infectious cases attempts must be made to store the body separate from other bodies

11.3.3 Post-mortem

Generally, post-mortems are NOT recommended. However, should one be required for legal reasons, or for an investigation, the mortuary staff must:

- Be aware of the diagnosis, proven or suspected
- Wear appropriate PPE, including a fit tested respirator if PTB is suspected
- Carry out the post-mortem in a well-ventilated room preferably with negative pressure ventilation particularly for TB
- Handle body tissues very minimally

Embalming is not recommended for infectious disease bodies!

11.3.4 Viewing of the body by relatives

- Viewing can be allowed, but the family must be informed of the risks involved
- Relatives must be provided with appropriate PPE
- When necessary, the number of relatives allowed to view the body must be restricted
- Only a trained member of staff should be allowed to touch the corpse and open the sealed body bags
- The visitors may look at the face but there should be no touching or last rites unless proper precautions are taken
- Ensure that hand hygiene is performed
- Permission from the IPC team or management is essential

11.3.5 Touching the body

The body may be touched after proper counselling ensuring that the person/family member understood the procedure. The relatives must be informed of the infectious nature of the disease, particularly with untreated pulmonary TB, viral haemorrhagic fever, and diphtheria or similar infectious diseases.

Provide appropriate PPE and hand hygiene must be performed.

11.3.6 Transport and burial of an infectious corpse

The family and relatives must be aware of the risks involved with the removal and transportation of the body.

- The body is placed in a coffin and sealed prior to transporting to the undertaker
- Viewing the body is not recommended
- No "hands-on" or touching rituals of the body are allowed
- If the body must be transported across borders it should be in a sealed coffin
- Incinerate the body when infectious disease is indicated

Table 53: Some important communicable diseases

Disease	Incubation period	Communicability	Precautions	Isolation
Acquired Immune deficiency syndrome (AIDS)	1-3 months; HIV to AIDS up to 15 years	Exposure to high viral loads (blood and body fluids)	Standard precautions, contact precautions if bleeding	None
Adenovirus	Up to 7 days	Virus in secretions and faeces	Contact and Droplet Precautions	Yes, Cohort during outbreak
Anthrax-pulmonary	1-7 days	Person to person transmission rare, happens through droplet inhalation	Avoid droplet inhalation	Yes
Anthrax- cutaneous	Up to 17 days	Contact with infected tissue	Standard precautions, contact precautions if an outbreak	No
Bronchiolitis in infants	3-4 days (variable)	Infective respiratory secretions	Droplet **and** Contact Precautions	Yes
Chicken pox	Up to 14 days	Until scabs are present	Airborne precautions	Yes
Cholera	2-3 days Hours to 5 days	While excreting in faeces	Contact precautions	Yes
Clostridium difficile	2-3 up to 14 days	Until symptoms clear	Contact precautions	Yes
Congo Crimean Haemorrhagic Fever	1-12 days	HAI- blood contact, infected animal and human tissue and secretions	Contact **plus** Droplet Precautions if bleeding	Yes
Dengue	3-14 days	No person-to-person transmission	Standard precautions	Yes
Ebola-Marburg	2-21 days	Person to person via blood - **High risk** during later stages of disease - semen is infectious	Contact plus droplet precautions if bleeding	Yes
Enteric fever (typhoid)	7 to 21 days	While excreting *S typhi, S paratyphi*	Contact precautions	Yes
Food poisoning *(Salmonella, Clostridium, staph aureus, E-coli, listeria*	Variable from hours to days	Until symptoms clear	Standard precautions	None
Gastro enteritis	Variable depending on pathogen	Until symptoms clear	Contact precautions	Yes
H influenzae (epiglottis)	4-7 days	Until symptoms clear	Droplet precautions	Yes
HAI multiple antibiotic resistant pathogens e.g., MRSA, VRE	Variable	Until clear or discharged	Contact precautions	Yes

Hepatitis A (HAV)	10-30 days	Latter half of incubation period and early jaundice	Contact precautions during prodrome and if diarrhoea occurs	None
Hepatitis B (HBV) (also delta)	45-180 days	All Hbs Ag positive persons via blood and body fluids	None, contact if bleeding	None
Hepatitis C (HCV)	2weeks – 6 months	1 week before onset of symptoms. If ALT raised	None, contact precautions if bleeding	None
Hepatitis E (HEV)	15-64 days	Not known	Contact precautions	None
Herpes zoster (shingles)	14 days	Until lesions are dry	Contact precautions	None
Influenza (all types)	1-3 days	3-6 days adults 7 days in children	Droplet precautions, airborne precaution for risk-prone procedures during epidemics	Yes, Cohort during outbreak
Lassa Fever	6-21 days	Person to person spread via secretions. and urine up to 6 weeks	Contact **and** droplet precautions	Yes
Measles	Up to 10 days	1 day before prodrome to 4 days after rash	Airborne and contact precautions	Yes
Meningococcal meningitis *(Neisseria meningitidis)*	2-10 days	Up to 24 hours post antimicrobial therapy; with effective standard treatment	Droplet precautions	Yes
Mumps	3-14 days	9 days after swelling	Droplet precautionss	Yes, Cohort during outbreak
Rota virus	4-14 days	When symptoms clear	Contact precautions droplet precautions during outbreaks	Yes, Cohort during outbreak
Rubella	4-10 days	7 days after onset of rash	Droplet Precautions	Yes
Pneumonic plague	1- 7 days	3 days after effective treatment	Droplet Precautions	Yes
Pneumonia in children	Variable	24 hour after effective treatment	Droplet and contact precautions	Yes
Respiratory Syncytial virus (RSV)	5-7 days	When symptoms clear	Droplet and contact precautions	Yes
Severe Acute Respiratory Syndrome (SARS)	3- 10 days	Probably 21 days	Droplet precautions. airborne precautions for risk-prone procedures e.g., intubation	Yes

Tuberculosis (pulmonary) Sensitive strains of MDR/ XDR-TB *(Mycobacterium tuberculosis)*	2-4 weeks could be shorter or longer as above	As long as untreated and up to 2 weeks after starting appropriate therapy or as long as smear positive	Airborne precautions	Yes, negative pressure
Typhoid *(Salmonella typhi)*	8-14 days	TThe patient remains infective while the bacterium is excreted in faeces 5-15% carriers in gall bladder	Contact precautions	Yes
Yellow fever	3-6 days	Mosquito bite	Contact precautions	Yes

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 (HAI) as well as antimicrobial resistance (AMR).[232] An appropriate environment, water, sanitation and hygiene (WASH)[233] services, materials and equipment for IPC are a core component of effective IPC programmes at healthcare facilities.[234] Healthcare buildings must comply with the national legislation and regulations, including the Namibian MoHSS Hospital Quality Standards 1st Edition, 2021.[235]

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.

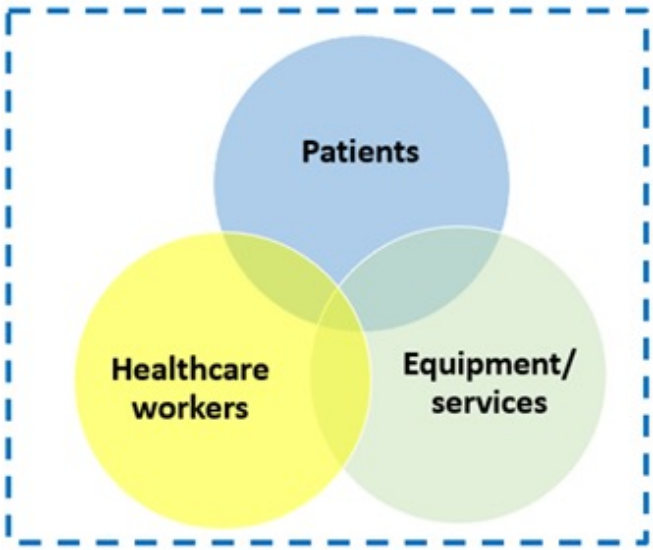
12.1 Built environment

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 [236]

The built environment has a direct effect on the implementation of IPC practices and workflow. **Figure 43** 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 OTs, neonatal units, burns units and sterile preparation, and decontamination areas.[237]

FIGURE 43: HEALTHCARE ENVIRONMENT RELATIONSHIPS



[232]Guidelines on Core Components of infection prevention and control at the national and acute healthcare facility level. WHO 2016. Available from https://apps.who.int/iris/handle/10665/251730
[233]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.
[234]Guidelines on Core Components of infection prevention and control at the national and acute healthcare facility level. WHO 2016. Available from. https://apps.who.int/iris/handle/10665/251730
[235]Namibia MOHSS. Hospital Quality Standards. April 2021
[236]UK Dep of Health.2013. Health Building Note 00-09: IPC in the built Environment. Available: https://www.england.nhs.uk/wp-content/uploads/2021/05/HBN_00-09_infection_control.pdf
[237]SA NDoH. 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

12.2 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.[238] 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. [239]

12.2.1 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.

12.2.2 Layout

The layout of all clinical areas should minimise transmission of infectious pathogens. Sufficient space should be provided for 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 staff workstation and rest area provided so that the clinical areas are not used for these 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 1.2-2m between beds to enable movement of carers and equipment. In high care areas, this distance should be increased to 2.5m between beds to allow for movement of equipment and to carry out aseptic procedures comfortably.[240,241, 242]

There should be adequate isolation facilities.[243] It is recommended that there are at least two isolation/single rooms with ensuite ablution facilities per 24 beds in hospitals.[244] 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. [245,246]

12.2.3 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 [247] , however in isolation rooms there should be one basin outside the entrance of the room. ABHR should be placed at the entrance of a clinical area and at the point of care.[248]

All consultation rooms should have facilities for hand hygiene in each room. **Table 54** provides the requirements for clinical handwash basin.

[238]Reproductive Health & HIV Research Unit of the University of the Witwatersrand, South Africa. Implementing TB Infection Control in health facilities. February 2009
[239]SA NDoH. 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
[240]Namibia MOHSS. Hospital Quality Standards. April 2021
[251]SA NDoH. 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
[242]Mehtar, S., 2010. Understanding Infection Prevention and Control. Juta & Company, Claremont, South Africa
[243]Namibia MOHSS. Hospital Quality Standards. April 2021
[244]South Africa National Department of Health. National Environmental Health Norms and Standards for premises and acceptable Monitoring Standards for Environmental Health Practitioners, 24 December 2015. Government Gazette; 2015
[245]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/
[246]SA NDoH. 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
[247]WHO Core Components of Infection Prevention and Control Programmes at the National and Acute Health Care Facility Level. 2016. Available: https://www.who.int/publications/i/item/9789241549929
[248]Hopman et al. Reduced rate of intensive care unit acquired gram-negative bacilli after removal of sinks and introduction of 'water-free' patient care. Antimicrobial Resistance and Infection Control (2017) 6:59DOI 10.1186/s13756-017-0213-0

Table 54: 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 • Dedicated to hand washing only • Do not have any plugs to prevent soaking of medical devices • Bowl deep enough to prevent splashing and contamination of clothes • No overflow outlet • No recesses for water to collection • Waterproof splashback and properly sealed • Wall mounted soap dispenser • Single use paper towel dispenser [249]
Taps	• Elbow operated mixer taps • Taps should not be aligned to run directly into the drainage aperture to prevent splashback[250]
Water	• Free running and at a comfortable temperature • Good quality water without contamination

12.2.4 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.[251]

12.2.5 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 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.

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.

12.2.6 Walls

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

12.2.7 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.

[249] Mehtar. S., 2010. Understanding Infection Prevention and Control. Juta & Company. Claremont. South Africa
[250] Mehtar. S., 2010. Understanding Infection Prevention and Control. Juta & Company. Claremont. South Africa
[251] SA NDoH. 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

12.2.8 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. [252]

12.2.9 Procedure trolleys

Procedure trolleys should have impervious and chemically 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 alcohol and allowed to dry before opening a sterile pack.[253]

12.3 Support areas

12.3.1 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.

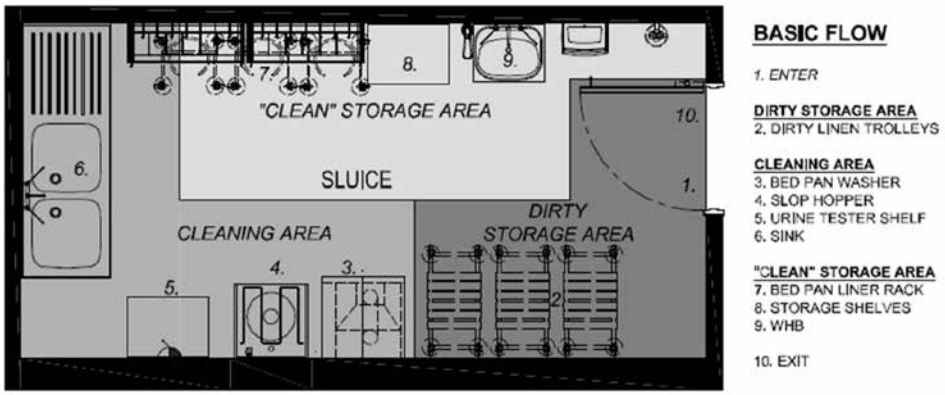
12.3.2 Storage facilities

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.

12.3.3 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.[254] **Figure 41** provides a schematic example of a one directional flow from dirty to clean in a sluice.

FIGURE 44: FLOOR PLAN FOR A SLUICE DISPLAYING A ONE-DIRECTIONAL FLOW



[252]Mehtar, S., Understanding infection prevention and control. 2010. Juta & Company. Claremont, Cape Town
[253]SA NDoH. 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
[254]Mehtar, S., 2010. Understanding Infection Prevention and Control. Juta & Company. Claremont. South Africa

12.3.4 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.[255]

12.3.5 Medical waste

Medical waste in clinical areas should be stored separately and not in the sluice area. Refer to Chapter 5 on the management of medical waste for the requirements of the storage areas for medical waste.[256]

12.3.6 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.

12.4 Water

The "*WHO standards for drinking water quality, sanitation and environmental health in health facilities*" [257] should be implemented. International 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 water must conform to the Namibian national standards for all domestic use. A water quality monitoring programme must be developed. All water supply, including borehole and water tanks, must be protected from contamination. The temporary storage capacity should be sufficient for 2 days.

Where borehole water is being used in a health facility, at least 15 m horizontal distance and 1.5m vertical distance between permeable faecal sludge containers and drinking-water sources is suggested. [258] Faecal sludge should not be discharged into an open drain, water body or open ground.

12.5 Sanitation

There must be adequate functioning toilet facilities which cater for staff and patients separately. Patient toilets should be available for both genders 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.[259] 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.[260]

Adequate toilet and ablution facilities should be provided at a hospital that meets the needs of patients, staff, and visitors.[261]

[255]A NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-preven[256]SA NDoH. 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
[257]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/
[258]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/
[259]Essential environmental health standards in health care. Edited by John Adams, Jamie Bartram, Yves Chartier ISBN 978 92 4 154723 9
[260]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.
[261]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.

- 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 12-15 patients
- Staff required to sleep on the premises must be provided adequate ablution facilities, including a shower/bath
- A drainage system must be in place and approved measures are utilised for the removal of wastewate
- An adequate supply of toilet paper, liquid soap and/or alcohol-based hand rub must be available at the facility [262]

12.6 Operating theatre

It is beyond the scope of this document to give a detailed account of specialised areas such as the OT and intensive care units. More detail about the OT can be found in the Namibia MoHSS Operation Theatre Manual 2nd Edition 2023.[263] The narrative below summarises the essential areas from an IPC perspective.

12.6.1 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 authorised 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 minimising inflow of air to the operating room. This positive pressure system is challenged every time a door is opened.

12.6.2 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 OT 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%-60%.[264,265] The Namibia MoHSS Operation Theatre Manual 2nd Edition 2023 provides more detail about the ventilation requirements in each area.

12.6.3 Cleaning in the operating theatre

The inanimate theatre environment should make a negligible contribution to the incidence of SSIs. Cleaning and disinfection of the OT 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 six months or as needed.

[262]SA NDoH. 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
[263]Namibia MOHSS Operation Theatre Manual 2nd Edition 2023
[264]Clinical Issues. June 2009: Vol 89:6 https://www.clinicalkey.com/service/content/pdf/watermarked/1-s2.0-S0001209209003366. pdf?locale=en_US&searchIndex=. South African Society of Anesthesiologists. 2013 Practice Guidelines. S Afr J Anaest Analg 2013;19(1): S1-42
[265]SA NDoH. 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

Important points that must be taken into consideration to keep the OT 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
- 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. [266,267]

12.7 Microbiological commissioning and monitoring

Commissioning must occur before an OT 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.[268]

- 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 OT

Routine culturing of clinical areas is unnecessary because inanimate objects and surfaces are seldom the cause of SSIs.[269]

The MoHSS hospitals quality standards, however, require regular environmental sampling in certain high-risk areas.[270]

[266]Pokrywka M, Byers K. Medscape: John Hopkins Medicine. Traffic in the operating room: a review of factors influencing air flow and surgical wound contamination. November 2015.
[267]Stauning MT, Bediako-Bowan A, Andersen LP, Opitam JA et al. Journal of Hospital Infections. Traffic flow and microbial air contamination in operating rooms a major teaching hospital in Ghana. Vol 99, p267-270.2008.
[268]SA NDoH. 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
[269]SA NDoH. 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
[270]MoHSS. Hospital Quality Standards. 2021.

CHAPTER 13: SURVEILLANCE AND OUTBREAK MANAGEMENT

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).[271] 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.

13.1 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
- Identify 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[272,273]

For ongoing HAI surveillance in HCFs, 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.[274]

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

13.2 Types of surveillance

The resources available for HAI surveillance will determine which surveillance method is most practical for an individual unit or facility. **Table 55** provides a summary of the different types of surveillance.[275]

Table 55: Types 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 timeperiod
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 lab datz

[271]CDC. Introduction to public health surveillance. Available: https://www.cdc.gov/training/publichealth101/surveillance.html#:~:text=Public%20health%20surveillance%20is%20%E2%80%9Cthe,health%20practice.%E2%80%9D%20%E2%80%94%20Field%20Epidemiology
[272]Dramowski. A., Bettercare.2022. https://bettercare.co.za/infection-prevention-and-control/07.html#surveillance-of-healthcare-associated-infections-hai
[273]WHO.2016. Guidelines on Core Components of IPC Programmes. https://www.who.int/teams/integrated-health-services/infection-prevention-control/core-components
[274]SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic
[275]Dramowski, A., IPC A guide for HCWs in low-resource settings. Bettercare. Available: https://bettercare.co.za/infection-prevention-and-control/index.html

13.3 Who is responsible for surveillance

A multidisciplinary IPC team should be responsible for data collection, analysis, interpretation, and dissemination of findings.[276] 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, microbiologists, medical practitioners, and epidemiologists (if available).

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.[277]

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.

Surveillance is a team effort

13.4 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, types of data collection
- Evaluation of data quality
- Reporting and feedback post implementation evaluation

The steps of the surveillance system include the following **(Figure 45):**

FIGURE 45: STEPS OF SURVEILLANCE

[276] Dramowski, A., IPC A guide for HCWs in low-resource settings. Bettercare. Available: https://bettercare.co.za/infection-prevention-and-control/index.html
[277] World Health Organisation. Healthcare-associated Infections Surveillance. Open WHO course. https://openwho.org/courses/IPC-HAI-EN

1. **Surveillance planning**
    - Assess the population to be surveyed
    - Select the outcomes for surveillance
    - Outcome 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 practices and develop interventions to reduce rates
5. **Evaluation**
    - Continuously evaluate the surveillance system[278]

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.

13.5 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 14 provides various SOPs for specimen collection of different samples.

13.5.1 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).[279]

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

[278]World Health Organisation. Healthcare-associated Infections Surveillance. Open WHO course. https://openwho.org/courses/IPC-HAI-EN
[279]CDC. National Healthcare Safety Network. Patient Safety Component Manual. Available: https://www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf

- 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

13.5.2 When classifying HAIs

The following must be considered when infections are classified:

- 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.[280]

13.5.3 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 indwelling 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.[281, 282]

Reactivation or transplacental transmission of viruses or bacteria is not considered to be an HAI

13.6 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)
- Ventilator-associated pneumonias (VAP)

13.7 Standardised case definitions for HAIs

Ideally, international, standardised HAI case definitions should be used to ensure reliability and consistency with other surveillance programmes. HAI surveillance can be particularly challenging in LMICs because of a lack of dedicated human resources, funds and expertise in epidemiology and IPC.

[280] CDC. National Healthcare Safety Network. Patient Safety Component Manual. Available: https://www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf
[281] SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic
[282] CDC. National Healthcare Safety Network. Patient Safety Component Manual. Available: https://www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf

Standardised 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).[283, 284] See **Table 56.**

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 18** for an example of a data collection tool.

Table 56 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: ***Criterion 1:*** Recognised pathogen cultured from at least one blood culture, unrelated to infection at another site. OR ***Criterion 2***: At least one of: fever (>38°C core), chills, hypotension. 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 &and 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) ➟ 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. AND ➟ AND ➟ A central line or umbilical line was in place on the date of the event (when infections were ➟ diagnosed or identified) or the day before. ➟ 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.

[283]CDC. National Healthcare Safety Network. Patient Safety Component Manual. Available: https://www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf
[284]SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic

Peripheral line-associated bloodstream infections
➟ A peripheral line was in place on the date of the event or the day before ➟ Patient has at least one of the following signs or symptoms: fever (>38°C), pain, erythema, or heat at the involved vascular site ➟ Patient has purulent drainage at involved vascular site ➟ Report infections of an intravascular annulation site without an organism cultured from blood as phlebitis ➟ 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)* ➟ 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, ➟ 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 for 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)* **NOTE:** whereWhere decontamination of medical devices and OToperatingtheatre facilities are suboptimal, surgery-associated infections should be considered.

There are three categories of SSIs:

Superficial incisional infection – involves only skin and subcutaneous tissue of incision

Patient has at least one 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 an SSI) AND Patient has at least one of the following signs or symptoms:
- Pain/tenderness, localised 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 one of the following:

- Purulent drainage from deep incision
- Deep incision that spontaneously dehisces or deliberately opened by surgeon and is culture positive or not cultured (a culture negative finding does not meet criterion) and
- Patient has at least one of the following signs and symptoms:
- Fever (>38°C) - localised 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 one 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 pneumonias

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.

Radiological: Chest X-Ray with diffuse/patchy infiltrates or localised infiltrates - one X-ray if no

underlying cardiac or pulmonary disease otherwise 2 X CXR

Pulmonary: Onset of purulent sputum, worsening gas exchange, cough or dyspnoea or tachypnoea

Systemic: Fever of > 38°C with no other known cause

Microbiology: Pus cells - moderate to many organisms (and consistent with gram stain)

13.8 How to calculate HAI rates

It is important that a consistent standardised method should be used to calculate HAI rates. **Table 57** 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 1,000 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. 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[285]

Table 57: 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. This number must be multiplied by 1,000 to get an incidence rate per 1,000 central line days. **Number of CLABSI infections x 1,000** **Total number of central line days = rate of CLABSI infection/1,000 central line days** **Counting central line days:** 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**

[285] SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-

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 1,000** **Total number of catheter days = rate of CAUTI infection/1,000 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.[286] **No of VAP cases x 1,000** **Total number of ventilator days = rate of CAUTI infection/1,000 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.[287]

Surveillance can measure the outcome of a problem or the process which can prevent or correct a problem.

13.9 What to measure during surveillance

13.9.1 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 58 provides an overview of the different between outcomes and process measure, the advantages of each and examples of each measure.[288]

infection-prevention-and-control-strategic

[286]???????????

[287]SA NDoH. 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

[288]Agency for Healthcare Research and Quality. Available: https://www.ahrq.gov/talkingquality/measures/types.html

Table 58: Process and outcome measures

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

Note: Routine environmental sampling is not indicated, except when a source must be confirmed during an outbreak. The MoHSS Hospital Quality Standards do however require regular sampling of high-risk areas.[289]

13.10 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 HCFs. 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 MoHSS National Technical Guidelines for Integrated Disease Surveillance and Response[290] 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 MoHSS National Technical Guidelines for Integrated Disease Surveillance and Response.[291]

13.10.1 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.[292]

13.11 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 43 depicts the steps to follow for the investigation of an outbreak.

[289] MoHSS Hospital Quality Standards. 2021
[290] MoHSS National Technical Guidelines for Integrated Disease Surveillance and Response.3rd Edition. 2023.
[291] MoHSS National Technical Guidelines for Integrated Disease Surveillance and Response.3rd Edition. 2023.
[292] Dramowski. A., Infection Prevention and Control. A guide for healthcare workers in low resource settings. 2022. Bettercare. Available: https://bettercare.co.za/infection-prevention-and-control/index.html

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).[293] 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

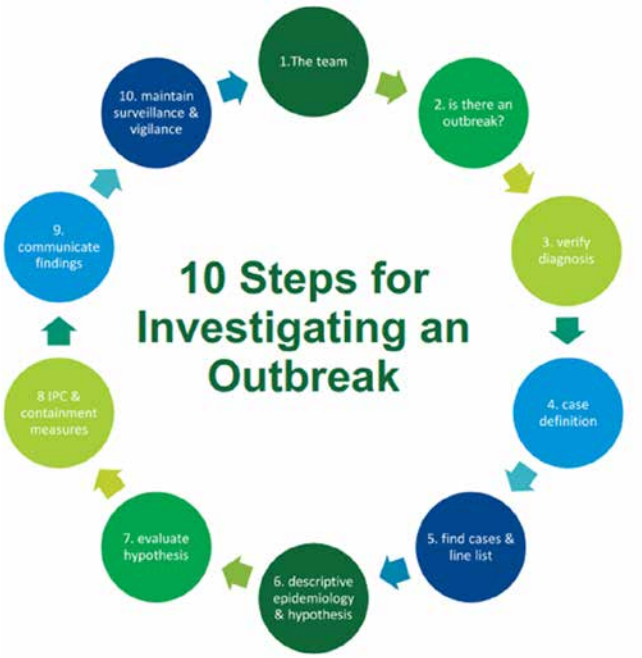
- **Communicate your findings**

  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.

- **Maintain surveillance.** [294,295]

[293]CDC. Basics of Epidemiology. https://www.cdc.gov/csels/dsepd/ss1978/lesson6/section2.html
[294]Dramowski. A., Infection Prevention and Control. A guide for healthcare workers in low resource settings. 2022. Bettercare. Available: https://bettercare.co.za/infection-prevention-and-control/index.html
[295]Mehtar, S., 2010. Understanding Infection Prevention and Control. Juta & Company. Claremont. South Africa

FIGURE 46: 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.

13.12 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 involved 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 surveillance 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

CHAPTER 14: ANTIMICROBIAL STEWARDSHIP

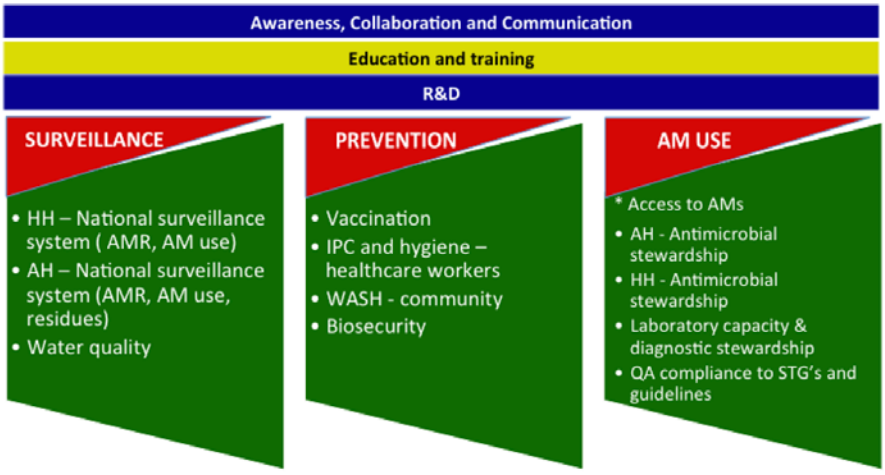
Antimicrobial resistance (AMR) is a major concern worldwide and can impact on the ability to treat infectious diseases, as well as undermining many other advances in healthcare. Underlying factors that drive AMR include the following: weak or absent surveillance and monitoring systems, inadequate systems to ensure quality and uninterrupted supply of medicines, inappropriate and irrational use of medicines, including in animal husbandry, poor IPC practices, and limited diagnostics, medication, and vaccines as well as insufficient research and development of new products.

14.1 Goals and strategic objectives of the NAAP

The Namibian Antimicrobial Resistance Action Plan (NAAP) was published in 2017 and details the following goals and strategic objectives (Figure 47):

- Surveillance
- Prevention
- Antimicrobial use
- Awareness, Collaboration and Communication
- Education and training
- Research and development

FIGURE 47: NAMIBIAN NAAP FRAMEWORK



The activities of the three pillars of awareness, collaboration, and communication; education and training; and research and development are cross-cutting and will therefore be implemented across the three key pillars of surveillance, prevention, and antimicrobial use.

14.1.1 Strategic Pillars of the NAAP

The following section provides a short summary of each of the strategic pillars:

1. Surveillance

To achieve monitoring capacity through surveillance to capture essential information on AMR and inform decision making

2. Prevention

To reduce the incidence of infection through effective hygiene, infection prevention and control measures, biosecurity and community access to water, sanitation and hygiene facilities and practices

3. Antimicrobial use

Responsible antimicrobial use is to reduce inappropriate antimicrobial use in humans and animals and therefore limit the emergence of AMR

4. Awareness, Collaboration and Communication

Improving awareness, collaboration and communication is key to reducing use and improves responsible antimicrobial use and reduces AMR

5. Education and training

Education and training are key to improving understanding of AMR and drug prescribing practices

6. Research and development

To promote research and development in IPC, WASH, biosecurity and vaccines, medicine use, indigenous knowledge systems and medicinal plants [296]

14.2 What is antimicrobial stewardship

IPC is an important component of an antimicrobial stewardship (AMS) programme and plays a major role in preventing the spread of multiple antibiotic resistant pathogens, especially gram-negative bacilli such as Klebsiella pneumoniae, Escherichia coli, and Pseudomonas aeruginosa to name but a few.

The primary goal of AMS is to improve patient outcomes while minimising the adverse effects of antimicrobial use, such as the development of antimicrobial resistance.

AMS activities promote the following:

- The use of antimicrobials only when indicated
- The appropriate selection of antimicrobials
- The appropriate dosing of antimicrobials
- The appropriate route and duration of antimicrobial therapy[297]

Antimicrobial stewardship activities promote the appropriate use of antimicrobials thereby aiming to reduce antimicrobial resistance

14.3 Requirements of an AMS programme

- Good liaison between IPC and the Microbiology Department so that all the relevant laboratory results are passed on to the IPC Team for immediate action
- To set up an AMS Committee with a minimum of a lead clinician, a pharmacist, an IPC person, and a medical microbiologist; an administrator must be present and committed to supporting the AMS programme. Other members can be co-opted as required
- Training of all doctors and in some cases nurses, on the appropriate and cautious use of antimicrobial agents
- Regular AMS ward rounds to evaluate antimicrobial usage carried out by the AMS team

[296] Namibian Antimicrobial Resistance National Action Plan. 2017
[297] Dramowski. A., Infection Prevention and Control. A guide for healthcare workers in low resource settings. 2022. Bettercare. Available: https://bettercare.co.za/infection-prevention-and-control/index.html

- ***Monitoring the use of antimicrobials for:***
    1. Appropriateness of prescription
    2. Correct dosage and duration
    3. Stopping unnecessary antimicrobials
    4. Changing from intra venous and intramuscular to oral wherever possible
- Keep a record of antimicrobial usage, the reduction in usage after implementing AMS, and correlating its impact with the presence of multiple antibiotic resistant pathogens
- Appropriate specimen collection and using an aseptic technique for the collection of specimens - refer to Appendix 14 for more detail about the collection of specimens
- Standard precautions must always be adhered to
- Additional IPC measures must be implemented whenever a case of MDRO is reported
- The IPC team must ensure that contact precautions are implemented and adhered to until it is deemed necessary to stop
- It might be necessary to implement additional measures to prevent further transmission, such as:
    5. Always emphasise hand hygiene and monitor compliance.
    6. Look for carriers through appropriate screening such as rectal swab (e.g., Carbapenem resistant enterobacter ales) and naso-pharyngeal swabs (e.g., Methicillin resistant staphylococcus aureus) - the screening protocols will depend on local epidemiology and the policies of different facilities.
    7. Ensure that the bedpans, urinals, and patient bowls are washed and disinfected at temperatures higher than 85˚C for 3 min or 90˚C for one minute - heat disinfection is not possible, bedpans must be washed with a detergent and water and disinfected with hypochlorite 1:1000 ppm
    8. Make sure that patient care articles are always clean and dry and dedicated to one patient if possible
    9. Discontinue antibiotics if not clinically indicated
    10. Remove all intravenous lines and urinary catheters if no longer required

Antimicrobial stewardship is a team effort that should involve everyone delivering and managing clinical care

CHAPTER 15: RISK MANAGEMENT AND RISK REDUCING STRATEGIES

Most healthcare-associated infections (HAIs) are preventable through the implementation of an effective and sustainable infection prevention and control (IPC) programme. Part of an IPC programme is the identification and management of risks associated with healthcare delivery, risk management provides a systematic approach towards identifying and managing infection risks.

Risk management in IPC is important to:

- Proactively reduce the risk
- Identify unsafe and hazardous practices
- Improve clinical practices
- Improve clinical outcomes and reduce HAIs
- Ensure safety of patients, visitors and health workers
- Recommend cost effective preventive measures[298,299]

15.1 Difference between hazard and risk

To understand risk management, it is important to understand the difference between a hazard and a risk.[300] IPC is based on risk assessment and the outcome or interventions will depend on the type and extent of risk a particular situation poses.

15.1.1 Hazard

A hazard is anything with the potential to cause harm to:

- A person (e.g., Injury or illness)
- Property (e.g., financial losses)
- The environment (e.g., contamination)

15.1.2 Risk

R***isk is a combination of the following:***

- Frequency of exposure to the hazard – how often does exposure to a hazard occur?
- Probability of an outcome (given the exposure) - what will happen when exposure to a hazard has occurred?
- Severity of the outcome - how serious is the outcome of this exposure?

Risk is determined by the interaction of an individual with a hazard.

Risk = Exposure X Probability X Severity

15.2 Risk management

Differing types and levels of risk exist in different healthcare settings, and it is therefore important for each HCF to conduct its own risk assessment and develop the necessary strategies to reduce the risks.

A successful approach to risk management occurs on many levels within an HCF:

- **Facility wide**

  Organisational risk-management policy, staff training, follow-up of outcomes, monitoring, and reporting

[298] International Federation of Infection Control. Risk Management. December 2013
[299] Australian Government National Health and Medical Research Council. Australian Guidelines for the prevention and control of infection in healthcare. 2019. Available: https://www.nhmrc.gov.au/sites/default/files/documents/infection-control-guidelines-feb2020.pd
[300] Australian Commission on Safety and Quality in Healthcare. 2019. Australian Guidelines for the Prevention

- **Ward or departmental:**

  All policies and SOPs should contain an element of risk management to ensure that risks are considered in every situation

- **Individual**

  Considering the risks involved in performing a specific procedure and questioning the necessity of the procedure as part of clinical decision-making or attending training sessions on e.g., hand hygiene or respirator fit testing [301]

15.3 The risk management process

Risk assessments should be conducted regularly through audits, analysis of reported events and IPC surveillance data to ensure that all staff understand their responsibility in managing these risks. The risk management process consists out of the following steps **(Figure 48):**

15.3.1 Establishing context

Identifying the context in which risk must be managed e.g., type of HCF, patient demographic, level of care, type of procedures and the support from management

15.3.2 Avoiding risk

Establishing whether the potential risk can be prevented by not doing a certain procedure e.g., inserts a urinary catheter

15.3.3 Identifying risks

Identify risk systematically and continuously through audits and using root cause analysis

15.3.4 Analysing risks

Considering the sources of the risk, their consequences, the likelihood that those consequences may occur, and factors that affect consequences and likelihood e.g., efficacy of existing controls. See the risks analyses matrix in **Figure 49** [302]

15.3.5 Evaluating risks

Comparing the level of risk with previous risk criteria and implement mitigation strategies and prioritise the risks for further action.[303]

15.3.6 Treating risks

Implementing appropriate mitigation strategies to reduce the risk, e.g., modify procedures, protocols, or work practices, providing training sessions and monitoring compliance with IPC practices and SOPs.

Monitoring and review are essential components of the risk-management process. This ensures that:

- New risks are identified
- Analysis of risk is verified against real data, if possible
- Risk treatment is implemented effectively

[301] Australian Commission on Safety and Quality in Healthcare. 2019. Australian Guidelines for the Prevention and Control of Infection in Healthcare. Available: https://www.nhmrc.gov.au/sites/default/files/documents/infection-control-guidelines-feb2020.pdf
[302] Australian Commission on Safety and Quality in Healthcare. 2019. Australian Guidelines for the Prevention and Control of Infection in Healthcare. Available: https://www.nhmrc.gov.au/sites/default/files/documents/infection-control-guidelines-feb2020.pdf
[303] Australian Commission on Safety and Quality in Healthcare. 2019. Australian Guidelines for the Prevention and Control of Infection in Healthcare. Available: https://www.nhmrc.gov.au/sites/default/files/documents/infection-control-guidelines-feb2020.pdf

Communication and consultation are further key elements of the risk management process. It is important that there is interactive exchange of information between management, health workers, patients, and other stakeholders.

FIGURE 48: RISK MANAGEMENT PROCESS

15.4 Analysing the risk

Identification and analysis of risk requires a systematic approach. Analysis is based on previous and current information, to provide a complete picture of occurrences. There could be several reasons such as the absence of policies, lack of training or lack of provisions, but most important is accountability. A matrix will assist with risk analysis and provide input into evaluation and decision making on whether the risks need action, and what the most appropriate risk mitigation strategies and methods may be. **Figure 49** provides an example of a risk analysis matrix. [304]

FIGURE 49: RISK ANALYSIS MATRIX

Likelihood	**Consequences**				
	Insiginificant	Minor	Moderate	Major	Catastrophic
Almost certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	High
Unlikely	Low	Low	Medium	Medium	High
Rare	Low	Low	Low	Medium	Medium

The likelihood and the consequences are considered when a risk is graded to establish the severity of the risk: e.g., low, medium, high or extreme and the interventions will be based on the impact of the risk.

Low risk: Manage by routine procedures

Medium risk: Manage by specific monitoring or audit procedures

High risk: This is serious and must be addressed immediately

Extreme risk: The magnitude of the consequences of an event, should it occur, and the likelihood of that event occurring, are assessed in context of the effectiveness of existing strategies and controls [305]

15.5 Methods of analysing risk

There are several methods that can be used to identify risks, the most used are the fishbone diagram or the 5 Whys.

[304] Australian Commission on Safety and Quality in Healthcare. 2019. Australian Guidelines for the Prevention and Control of Infection in Healthcare. Available: https://www.nhmrc.gov.au/sites/default/files/documents/infection-control-guidelines-feb2020.pdf
[305] Australian Commission on Safety and Quality in Healthcare. 2019. Australian Guidelines for the Prevention and Control of Infection in Healthcare. Available: https://www.nhmrc.gov.au/sites/default/files/documents/infection-control-guidelines-feb2020.pdf

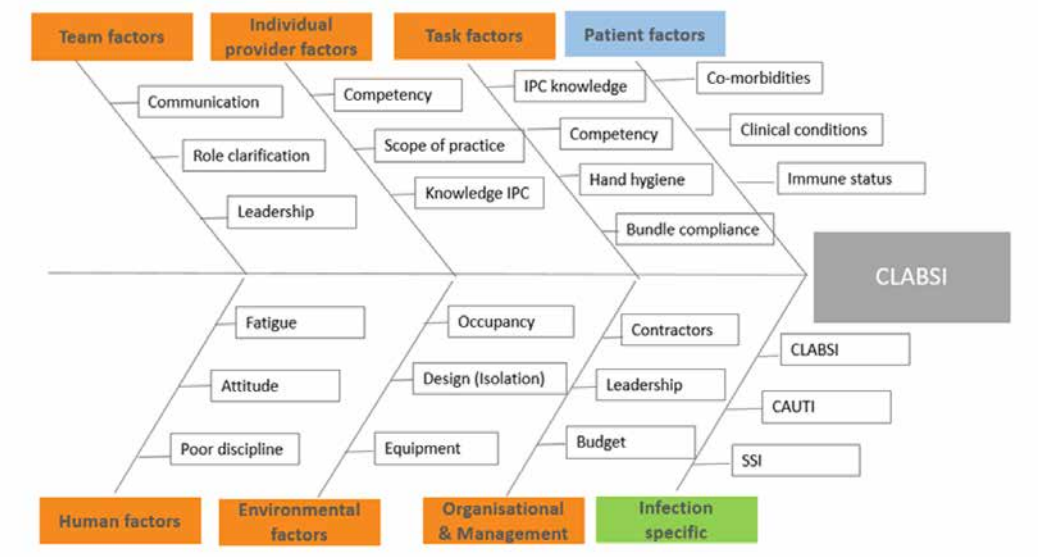
15.5.1 Fishbone diagram

The fishbone diagram **(Figure 50)** is used to identify and analyse all the potential causes or contributing factors of a specific problem or event.[306,307]

Causes are usually grouped into different categories and the following can be included:

- **People:** Anyone involved with the process
- **Method:** How the process is performed and the specific requirements for doing it, such as policies, procedures, rules, regulations, and laws
- **Equipment:** Any equipment, tools, instruments, etc. required to accomplish the task
- **Material:** Raw materials, medication, parts, pens, paper, information, used in the process
- **Measurement:** Data generated from the process that are used to evaluate its performance
- **Environment:** The conditions, such as location, time, temperature, and culture in which the process operates

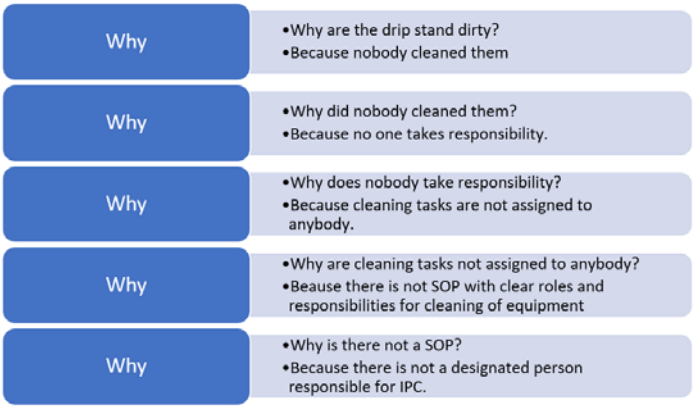
FIGURE 50: FISHBONE DIAGRAM



15.5.2 The 5 Why's

Another method that can be used to analyse risk is the **'5 Why's',** where you keep on asking 'why' (until you find the cause of the problem) until you have the answer. By repeatedly asking the question "Why?" you can peel away layers of symptoms, which can lead to the root cause of a problem.[308] **Figure 51** provides an example of how the "five Why's" methodology can be used.

FIGURE 51. FIVE WHY'S



[306]MCSA. Continuous Improvement. Model 3. 2017. https://asq.org/quality-resources/fishbone; https://www.cms.gov/medicare/ provider-enrollment-and certification/qapi/downloads/fishbonerevised.pdf.
[307]American Society of Quality (ASQ). https://asq.org/quality-resources/fishbone
[308]American Society for Quality (ASQ). Five Whys and Five Hows Model 3. 2017. https://asq.org/quality-resources/five-whys.

Once a risk has been identified, the necessary interventions must be implemented to reduce the risk and consequently HAIs. There are further factors that influence HAIs which are detailed in the next section.

15.6 Factors affecting HAI

The role of an IPC programme, and particularly the IPC Team, is to reduce the risk of transmission of micro-organisms by supporting clinical practice with education and evidence based clinical advice. There are several factors which influence HAI, and these factors can be administrative, clinical, and environmental related.

15.6.1 Administrative factors

- Shortage of health workers with clinical staff working in several areas of the hospital on one shift - they can transfer pathogens between units and might take shortcuts that compromise IPC standards [309]
- Overcrowding of clinical areas
- Lack of written IPC policies or structures
- Lack of formal training in IPC for health workers and managers
- Inadequate equipment supplies or facilities
- Inadequate procurement and quality of medical equipment
- Inadequate health budget and no designated funds allocated for IPC
- Poor state of repair and maintenance of existing facilities
- Poor hospital planning and design, built without knowledge of IPC or foresight of emerging infectious diseases
- Inadequate functioning infrastructure, for example, hand washing basins and sterile services, constant, clean water supply, and the correct phase of electricity
- Inappropriate transfer of patients between HCFs with a recognised or unrecognised endemic problem of nosocomial pathogens [310]

15.6.2 Environmental factors

- Prolonged hospital stay, particularly for the elderly or chronic disease patients
- Specialised units with specific antimicrobial resistant pathogens. e.g., Methicillin resistant staphylococcal aureus (MRSA)
- Extensive and unnecessary use of disinfectants leading to emergence of multiple antimicrobial -resistant pathogens
- Inadequate cleaning of the surfaces
- Incorrect storage of sterile supplies and medical devices
- Poor cleaning and disinfection of non-clinical equipment such as bedpans and urinals colonised with gram-negative bacteria
- Food supply and kitchens poorly maintained
- Inadequate ventilation, water, or sanitation across the healthcare facility
- Poor waste management
- Pests and the inability to control them [311]

[309] 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
[310] Mehtar, S., 2010. Understanding Infection Prevention and Control. Juta & Company. Claremont, Sout Africa
[311] Mehtar. S., Understanding Infection Prevention and Control. Juta & Company. Claremont. South Africa

15.6.3 Clinical factors

Antimicrobial usage:

- The lack of antimicrobial control increases selection of resistant bacteria which leads to HAI. AMS programmes might not exist, and policies are present but not implemented.

Inadequate IPC measures:

- Support for IPC measures depend on the available finances to provide adequate PPE and medical supplies, training of health workers and adequate infrastructure such as clean water and hand hygiene facilities.

Vulnerable patient population that is more susceptible to infections: [312]

- - Patients admitted for a completely different clinical condition, harbouring a transmissible pathogen e.g., a surgical patient with undiagnosed open pulmonary tuberculosis admitted to an open surgical ward and only suspected of having TB after one week.

15.7 Risk reducing strategies

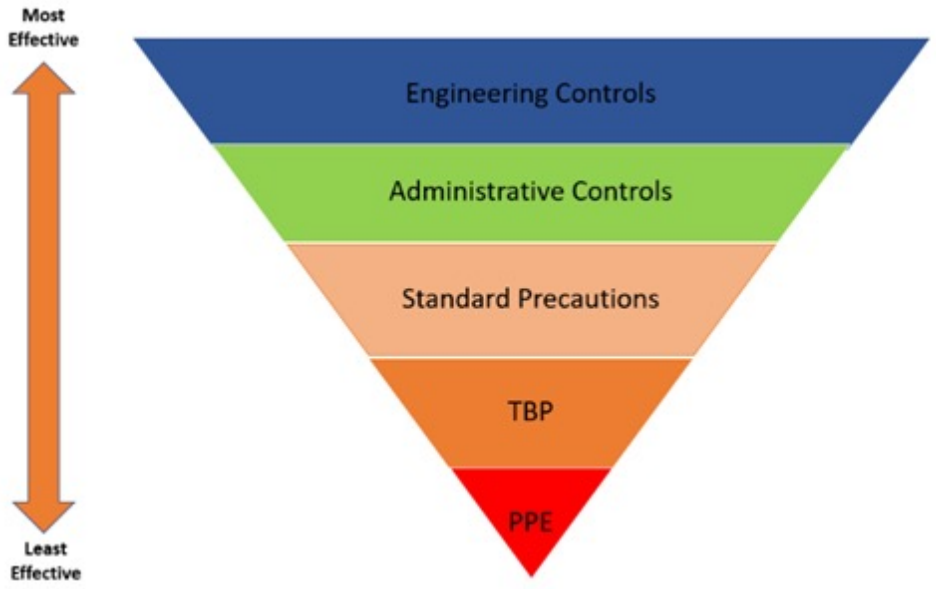
The risk of transmission of pathogens can be reduce when specific interventions are implemented, and the outcomes of these interventions are measured.

Examples of such interventions are (Figure 52):

- **Engineering Control**
  - Building and safety during renovations
  - Ventilation
  - Isolation
  - Safe and continuous water supply
  - Placement of hand washbasins
  - Built environment
  - Safe and continuous water supply
- **Administrative Controls**
  - Effective leadership
  - Clinical ownership
  - Policies and procedures
  - Education and training
  - Research and development
  - Surveillance
  - Procurement
  - IPC bundles
  - Quality improvement
  - Behaviour change
- Standard precautions (including hand hygiene and environmental cleaning)
- Transmission-based precautions precautions [313]

[312] Mehtar. S., Understanding Infection Prevention and Control. Juta & Company. Claremont. South Africa
[313] Mehtar. S., 2010. Understanding Infection Prevention and Control. Juta & Company. Claremont. South Africa

FIGURE 52: RISK REDUCING STRATEGIES



The list is not complete. There are additional interventions that can be followed such as the implementation of surveillance and AMS programmes. Most of these interventions and strategies have been covered in previous chapters. This chapter will focus on the implementation of bundles to prevent HAIs.

15.8 Infection control (care) bundles

Bundles are a structured way of improving processes of care and patient outcome. A Bundle consists out of a set of evidence-based practices (normally 3-5), with the purpose to improve patient outcomes, when performed collectively and reliably. When bundles are implemented consistently, they can prevent HAIs.[314]

Note: Principles of asepsis such as hand hygiene, appropriate PPE, and setting up and maintaining a clean/sterile field is essential for all aseptic procedures and when implementing bundles

15.8.1 Principles for implementing infection control bundles

The whole bundle must be implemented and compliance of the bundles is important to ensure the desired outcomes.

- Checklists are used to prompt or record the elements of care rendered (**Appendix 16**)
- A bundle checklist guides the person performing the task and serve as a reminder of the essential steps required to prevent infection
- Bundle compliance must be assessed and measured on a regular basis
- Barriers to non-compliant elements must be resolved/addressed to reduce infections and improve patient outcomes
- Both process and outcomes measures must be monitored

Note: All elements of a bundle must be adhered to all the time by all staff for maximum benefit

[314] Institute for Healthcare Improvement. Available: http://www.ihi.org/resources/Pages/ImprovementStories/WhatIsaBundle.aspx

Table 59 provides examples of different Bundles and the elements of each.

Table 59: Bundle elements

Bundle	Elements
Central-line associated bloodstream infections (CLABSI)	• Hand hygiene • Aseptic insertion technique • Chlorhexidine skin antisepsis of the insertion site. • Optimal catheter insertion site selected after weighing infection risk* and possible complications • Daily review of necessity for the line, prompt removal of unnecessary central lines **The subclavian route has the lowest risk of infection; the femoral site the highest (especially in obese adult patients).* Other evidence-based elements of care are not excluded and may be added to the central line bundle by individual facilities, for example: • The type of CV catheter - triple lumen, use of three-way taps etc • How the line is secured • Dressing is clean and intact
Catheter-associated urinary tract infections (CAUTI)	• Avoid unnecessary urinary catheters • Insert urinary catheters using aseptic technique and maintain a closed system of drainage.[315] • Maintain urinary catheters based on recommended guidelines • Review urinary catheter necessity daily and remove promptly The bundle elements are not exclusive and other scientifically proven elements of available evidence-based guidelines can be added by each individual health facility [316]

[315]World Health Organization. How to insert an indwelling catheter. Available from: https://www.youtube.com/ watch?v=7a4aNFJoZdQ&feature=youtu.be
[316]SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic

Surgical site infections (SSI) [317]	• Appropriate use of prophylactic antibiotics (including appropriate selection, timing, and duration/ discontinuation) • Appropriate hair removal: Avoid shaving; where depilation is necessary, use a clipper or depilatory cream • Maintain post-operative glucose control (*for major cardiac surgery patients cared for in ICU) • Peri-operative normothermia (** for all colorectal or open abdominal surgery patients) **Glucose control: Review of evidence shows that the degree of hyperglycaemia in the postoperative period correlates with the rate of SSI in patients undergoing major cardiac surgery. Although glucose control may benefit other surgical populations, some facilities only apply the measure to cardiac surgery population for the purpose of measuring compliance.* ***Normothermia: Evidence suggests that patients have a decreased risk of surgical site infection if they are not allowed to become hypothermic during the perioperative period. Although temperature control may benefit other surgical populations, some facilities only apply the measure to colorectal or open abdominal surgical population for the purpose of measuring compliance.* [318] Additional evidence-based components of good quality surgical care may be added by each individual health facility. Compliance with the SSI bundle has been most successful when all elements are executed together. Detailed tools are available to support the prevention of surgical site infections. [319]
Ventilator-associated pneumonia (VAP) in adults	• Elevate the head of the bed to 45 degrees, when possible, otherwise attempt to maintain the head of the bed greater than 30 degrees • Daily evaluation of readiness for extubation • Subglottic secretion drainage • Oral care and decontamination with chlorhexidine (0,5%). • Initiation of safe enteral nutrition within 24-48 hours of ICU admission.

Other important interventions are adherence to **aseptic technique**s such as urinary catheter insertion, **insertion** of peripheral lines and central venous **catheters**. Appendix 15 refer to the procedures for the insertion of devices such as urinary **catheters.** Appendix 16 further provides examples of checklists for the monitoring of daily compliance with the bundles.

[317] World Health Organization. Global Guidelines for the Prevention of Surgical Site Infection. Geneva. 2017
[318] World Health Organization. Global Guidelines for the Prevention of Surgical Site Infection. Geneva. 2017
[319] World Health Organization. Implementation manual to support the prevention of surgical site infections at the facility level – Turning recommendations into practice. 2018. Available from: https://www.who.int/infection-prevention/tools/surgical/en/

CHAPTER 16: HEALTH WORKER SAFETY

Occupational health and safety programmes aim to prevent diseases and injuries occurring during the course of work. Providing a healthy and safe workplace contributes to improving the quality and safety of patient care, and the retention of health workers while creating a culture of safety, which should be an integral part of healthcare delivery.

16.1 Common occupational hazards for health workers

- **Occupational infections** - tuberculosis, hepatitis B and C, HIV, respiratory infections (e.g., coronaviruses, influenza) and vector-borne diseases (e.g., malaria, dengue).
- **Ergonomic hazards** - unsafe patient handling, heavy lifting, awkward postures causing back injury, chronic lower back and neck pain and other musculoskeletal disorders
- **Hazardous chemicals** - cleaning and disinfecting agents, mercury, latex allergy, toxic drugs, insecticides for vector control
- **Exposure to radiation** - ionizing (x-rays and radionuclides) and non-ionizing (lasers, ultraviolet)
- **Psychosocial hazard** - time pressure, lack of control over work tasks, long working hours, shift work and lack of support
- **Violence and harassment** – physical, sexual, and psychological abuse and harassment at work
- **Risks in the ambient work environment** - thermal discomfort (heat or cold stress) and noise
- **Injuries** - slips, trips and falls, road traffic injuries (ambulance crashes, motorbike, and bicycle injuries), electric shock, explosions, fire
- **Environmental health risks**

16.2 Strategies to improve the safety of health workers

- Vaccination (Hepatitis B) [320] - consult the MoHSS standard treatment guidelines for detailed information about dosages [321]
- Identification of hazards and associated risks through regular audits
- Education and training of health workers
- Adherence to standard and transmission-based precautions.
- Use or appropriate PPE
- Medical surveillance
- Safety culture and blame free reporting
- Prevention of needlestick injuries
- Post-exposure prophylaxis [322]
- TB Screening for health workers

[321] MoHSS Namibia Standard Treatment Guidelines. 2nd Edition. 2021
[322] 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

CHAPTER 17: EDUCATION AND TRAINING

To ensure a strong infection prevention and control (IPC) programme, several key elements must be in place at the national level. First and foremost, there should be a national policy mandating that all health workers receive comprehensive IPC training through in-service programs. This training should follow an approved IPC national curriculum that aligns with the country's guidelines and is endorsed by the appropriate regulatory body. Additionally, a national system and schedule should be established for monitoring and evaluating the effectiveness of IPC training and education programmes, with evaluations conducted at least annually. These measures will help maintain a high standard of IPC practices among health workers and contribute to the overall safety and quality of healthcare delivery. The level of the training should be structured according to the level of competence expected from the health worker. All training activities must be recorded to identify those that have been trained and to highlight needs for further training.

Training is an essential part of an IPC programme and should be aimed at all health workers, with specific training for IPC staff. The information given must be evidence-based and well referenced, applicable to the work environment and constantly updated with refresher courses. All health workers must have at least a basic course in IPC and regular in-service training in IPC activities, to ensure that they understand and support the IPC programme. By understanding the basics of transmission, all health workers can contribute towards reducing HAI by implementing simple yet effective IPC measures.

The WHO Core Components of IPC identifies three groups that require training:

1. IPC staff
2. Healthcare professionals
3. Support (non-clinical) health workforce including administrators, sterile services, cleaners, and porters

A national IPC curriculum includes a link nurse programme [323,324]

Note: IPC capacity and expertise depends on the level of implementation of WHO Core Component 3: Education and training. Each country should have a national IPC curriculum and training programme developed in collaboration with academic institutions and aligned with national guidelines

The WHO Minimum Requirements for IPC recommends a stepwise approach to ensure adequately trained health workers.[325] WHO Core Component 3 further recommends that there should be support at the national level for IPC professionals to receive education and training to achieve an expert level of knowledge and that educational programmes should be endorsed by local academic institutions. IPC specialisation should reflect in future career paths.[326]

17.1 Who should be included in training programmes

The following categories of health workers should be included in training programmes:

Basic IPC should be incorporated into all health professions undergraduate training for -

- New Employees
- Nurses
- Doctors
- Microbiologists
- Pharmacists

[323]WHO. Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. 2018. Available: https://www.who.int/publications/i/item/9789241549929
[324]WHO. Core Competencies for Infection Prevention and Control Professional. 2020. https://www.who.int/publications-detail-redirect/9789240011656
[325]WHO Minimum requirements for IPC programmes. 2019. https://www.who.int/publications/i/item/9789241516945
[326]WHO. Core Competencies for Infection Prevention and Control Professional. 2020. https://www.who.int/publications-detail-redirect/9789240011656

- IPC Link Nurses
- Environmental Health Practitioners
- Undergraduate medical students
- Allied Health workers
- Cleaners
- Healthcare leaders

17.2 Frequency of training

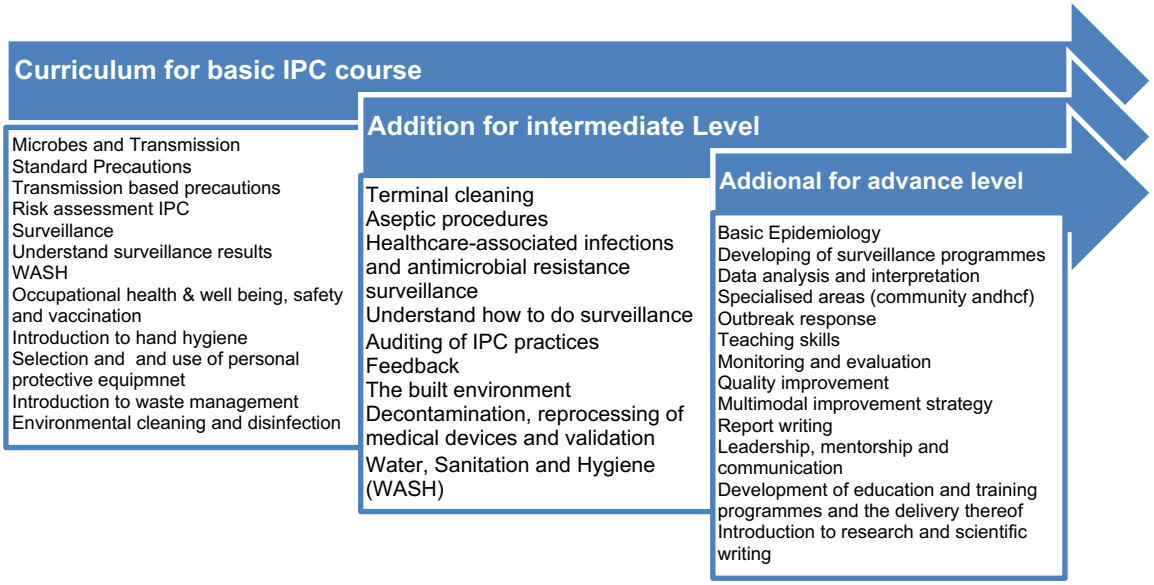
- As part of training for undergraduate students
- Upon appointment of new staff
- During on-boarding
- Annually
- On the spot (as the need arises) [327,328]

17.3 Curriculum

Training in IPC should progress from the essential (basics) to the specialised. IPC is a process which encompasses healthcare procedures, but also requires skills such as management, communication and writing, feedback, conceptual skills to give expert input into the layout of health facilities design and various other aspects to reduce transmission. **Table 61** outlines the topics that should be covered in different curricula starting with the basics and progressively becoming more complex, requiring in-depth knowledge at postgraduate diploma level in IPC (PDIC) level **(Figure 53).**[329]

Note: Training should be delivered by tutors trained in IPC with knowledge grounded in the most recently available evidence-based practices

FIGURE 53: PROPOSED STEPWISE STRUCTURE FOR A NATIONAL IPC CURRICULUM



[327]WHO. 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/"
[328]WHO. Core Competencies for Infection Prevention and Control Professional. 2020. https://www.who.int/publications-detail-redirect/9789240011656
[329]SA NDoH. 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

17.4 Different training programmes

Table 60 provides a recommendation of the level of IPC training that different categories of health workers should receive. [330]

Table 60: Recommended training for categories of health workers

Course	Category of health worker
Basic IPC for all health workers	Clinical practitioners including nurses and doctors, allied healthcare professional, support services and ancillary workers
Intermediate	Link nurses* Healthcare Managers IPC practitioners *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 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
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	• 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

Topics that should be included in the different training programmes are detailed in Table 61. **Table 61:** [331]

Table 61: 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

[330] SA NDoH. 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

[331] SA NDoH. 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

Environmental cleaning	X	X	XX	XXX
Safe patient care articles	X	X	XX	XXX
Interpreting HAI surveillance	X	X	XX	XXX
Patient environment, zone &and surroundings	X	X	XX	XXX
Safe handling &and disposal of sharps	X	X	XX	XXX
Healthcare waste management	X and 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 &and bundles			XX	XXX
Epidemiology &and basic statistics			XX	XXX
IPC &and the built environment &and ventilation			XX	XXX
Health facility layout and workflow			XX	XXX
WASH			XX	XXX
Specialised areas				
OT, Burns, NNU, isolation, maternity, A & E, ambulance			XX	XXX
Outbreak response - community and health facility		X	XX	XXX
Teaching &and training skills		X	XX	XXX
Writing reports			XX	XXX
Monitoring &and 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 &and managers				XXX

The WHO further recommends that the following areas and core competencies should be included in a curriculum for IPC professionals/practitioners **(Table 62):**

Table 62: Core competencies for IPC professionals

Areas	Competencies
Leadership and IPC programme management	IPC program management and leadership
	Built environment in health care facilities
Microbiology and surveillance	Basic microbiology
	Antimicrobial resistance prevention
	Healthcare-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 pneumonia
	Healthcare-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

The MoHSS developed a national IPC curriculum that contains more detail about the specific requirements for the different levels of IPC training.

CHAPTER 18: MONITORING, EVALUATION AND QUALITY IMPROVEMENT

Monitoring and evaluation (M&E) assists programme implementation and continuously motivates and supports implementers. It provides a systematic method to document the progress and impact of IPC programmes in terms of defined indicators.[332] There is little value in monitoring or auditing without timely feedback to managers and health workers at the 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 to reduce HAI and AMR through a multimodal strategy (MMS) approach.[333]

M&E further assist in engaging 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 be tested. This should take place in a blame-free environment.[334]

M&E should include an assessment of the extent to which standards are being met, goals accomplished, and 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.[335]

18.1 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. [336]

18.2 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.

18.3 Implementing a monitoring, evaluation, and feedback programme

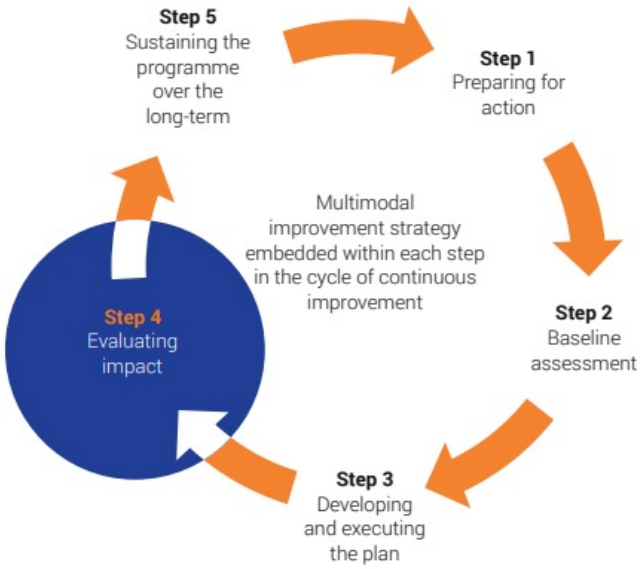
- There must be clear goals, targets, and activities
- Tools for data collection must be developed - existing tools can be adapted to local needs and circumstances
- Clearly defined processes and indicators over a wide range of activities such as:
  - ➟ Hand hygiene compliance
  - ➟ Consumption of ABHR
  - ➟ 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

[332]WHO. 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/
[333]SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic
[334]SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic
[335]WHO. 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/
[336]WHO. 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/

- 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 [337]

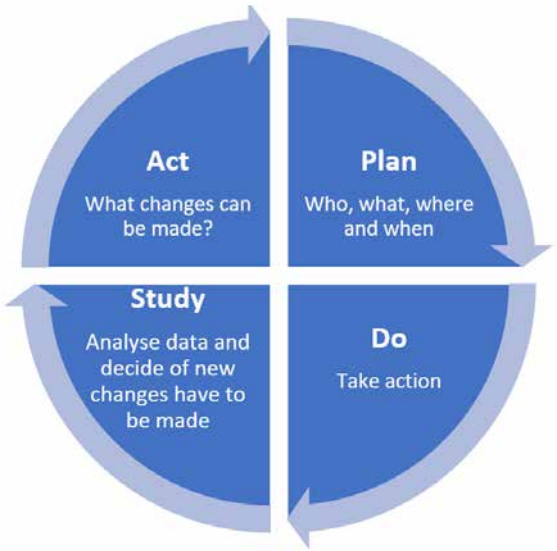
The WHO developed a five-step cycle of improvement to support implementation of interventions which is grounded in the principles of successful change and improvement in health care. Step four of the cycle is to evaluate the impact of the improvement, thus using the data collected to drive improvement and implement changes where required. **See Figure 54.**[338,339]

FIGURE 54: 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 55).**[340] Time invested in monitoring, audit and timely feedback are driving forces towards improvement and changing behaviour.

FIGURE 55: PLAN-DO-STUDY-ACT CYCLE



[337]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
[338]SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic
[339]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
tion-prevention-and-control-strategic
[340]Institute for Healthcare Improvement. Available: https://www.ihi.org/resources/Pages/ImprovementStories/QandAonQISixQuestionsForIHIImprovementAdvisor.aspx
tion-prevention-and-control-strategic

18.4 Regulations for IPC in Namibia

The MoHSS Hospital Quality Standards should be used to monitor IPC practices as set out in Chapter 8.[341]

18.5 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 63: Audit tools and frequency of use

Tools	Frequency of assessment
WHO Hand hygiene tool [342]	Quarterly
WHO IPC Assessment Framework at facility level (IPCAF) 2018[343] - Minimum Requirement	Annually
WHO Hand Hygiene Self-Assessment Framework. 2010 [344]	Annually
WHO Washfit Assessment Tool [345]	Annually
Namibia Quality Standards tool	Baseline and six monthly ***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.

18.5.1 Examples of audits

- Availability of infrastructure to perform hand hygiene (e.g., availability of water, liquid soap, paper towels, alcohol-based hand rubs)
- Compliance with hand hygiene protocols
- Environmental cleaning compliance
- Adherence to use of approved cleaning and disinfection materials
- Disinfection and sterilisation 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)
- Hospital kitchen audits (Appendix 19 refers to the SOP for monitoring of the hospital kitchen) - regular inspections of the kitchen are also a requirement from the MoHSS Quality Standards [346]

18.6 Quality improvement

Results from M&E programmes should be used to develop quality improvement programmes. Quality improvement in IPC refers to a systematic approach to enhance the processes and outcomes related to preventing and controlling

[341]MoHSS Hospital Quality Standards 1st Edition 2021.
tion-prevention-and-control-strategic
[342]Hand hygiene audit tool. Available: https://www.who.int/teams/integrated-health-services/infection-prevention-control/hand-hygiene/monitoring-tools
tion-prevention-and-control-strategic
[343]WHO IPC Assessment Framework as facility level (IPCAF). 2018. Available: https://www.who.int/publications/i/item/WHO-HIS-SDS-2018.9
[344]WHO Hand Hygiene Self-Assessment Framework. Available: a https://cdn.who.int/media/docs/default-source/integrated-health-services-(ihs)/hand-hygiene/monitoring/hhsa-framework-october-2010.pdf?sfvrsn=41ba0450_6
[345]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
[346]MoHSS Namibia. Hospital Quality Standards 1st Edition 2021

of infections within healthcare settings. It involves identifying areas for improvement (e.g., through monitoring programmes), implementing interventions, measuring the impacts and adjusting them to achieve better IPC practices.

18.7 Approach to quality improvement

A quality improvement 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 such as COHSASSA consistently

- **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

18.7.1 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 56) recommend the following approach:

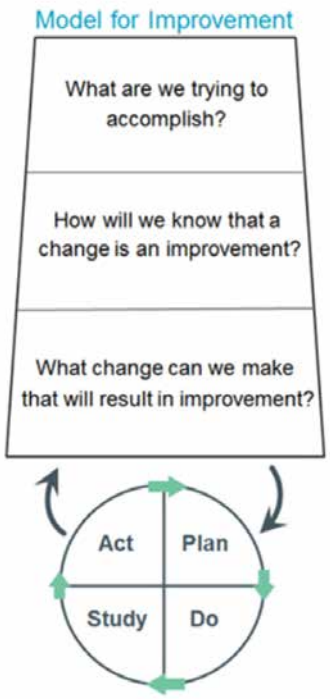
Three fundamental questions are asked which can be addressed in any order.

- 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 improvement? [347]

The "Plan-Do-Study-Act (PDSA) cycle" that is used to test changes in real work settings. The PDSA cycle guides testing a change to determine if the change is an improvement. [348]

[347] Institute of Healthcare Improvement. Model for Improvement. Available https://www.ihi.org/resources/Pages/HowtoImprove/ScienceofImprovementHowtoImprove.aspx
[348] Institute of Healthcare Improvement. Model for Improvement. Available https://www.ihi.org/resources/Pages/HowtoImprove/ScienceofImprovementHowtoImprove.aspx

FIGURE 56: MODEL FOR IMPROVEMENT [349]



It is important that problems and risks are identified and that the necessary interventions are implemented to mitigate the risks or solve the problem.

18.8 Steps of quality improvement

The following steps should be followed to implement a quality improvement 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 organisation or to other organisations. [350] It is important that the outcome of quality improvement projects are shared with management teams as well as the health workers in the units where the project was implemented, and that progress is shared continuously.

18.9 Multimodal improvement strategy

Following a multimodal improvement strategy (MMIS) will further aid in achieving sustainable change. The WHO recommends that multiple approaches should be used to influence behaviour of health workers. Implementing multimodal strategies should be aligned with the aims and initiatives of quality improvement programmes and accreditation bodies at the national and facility levels.

[349] Institute of Healthcare Improvement. Model for Improvement. Available https://www.ihi.org/resources/Pages/HowtoImprove/ScienceofImprovementHowtoImprove.aspx
[350] Institute of Healthcare Improvement. Model for Improvement. Available https://www.ihi.org/resources/Pages/HowtoImprove/ScienceofImprovementHowtoImprove.aspx

The MMIS consists of the following elements:

1. **System change (build it):** To support and enable IPC practices such as infrastructure, supplies, equipment, and other resources
2. **Training and education (teach it):** Increase and improve health worker knowlede. This is crucial for IPC to be accepted by the other teams
3. **Monitoring and feedback (check it):** To assess the problem, drive approriate changes and document improvement in practices
4. **4Reminders in the workplace (sell it):** Promote the desired outcomes and constant reminders for IPC. Annual campaigns are part of this element.
5. **Culture of safety (live it):** This provides a safe, blame free environment to facilitate an organisation climate that values the intervention, with a focus on involvement of senior managers, champions, or role models [352]

Targeting only ONE area (i.e., unimodal), is highly likely to result in failure. All - all five areas should be considered, and the necessary action taken, based on the local context and situation, informed by periodic assessments.

By utilising 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 sterilisation practices.[353]

[351]WHO. Multimodal Improvement Strategy. https://cdn.who.int/media/docs/default-source/integrated-health-services-(ihs)/infection-prevention-and-control/core-components/ipc-cc-mis.pdf?sfvrsn=5e06c3d5_10&download=true
[352]WHO. Multimodal Improvement Strategy. https://cdn.who.int/media/docs/default-source/integrated-health-services-(ihs)/infection-prevention-and-control/core-components/ipc-cc-mis.pdf?sfvrsn=5e06c3d5_10&download=true
[353]WHO. Multimodal Improvement Strategy. https://cdn.who.int/media/docs/default-source/integrated-health-services-(ihs)/infection-prevention-and-control/core-components/ipc-cc-mis.pdf?sfvrsn=5e06c3d5_10&download=true

Appendix 1:

Cleaning and heat disinfection of liquid soap containers

Step 1: Wash used containers with soap and lukewarm water in a designated sink, ensuring all traces of soap is removed.

Step 2: Fill a bowl with 250-500ml 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 three 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 and discard if damaged

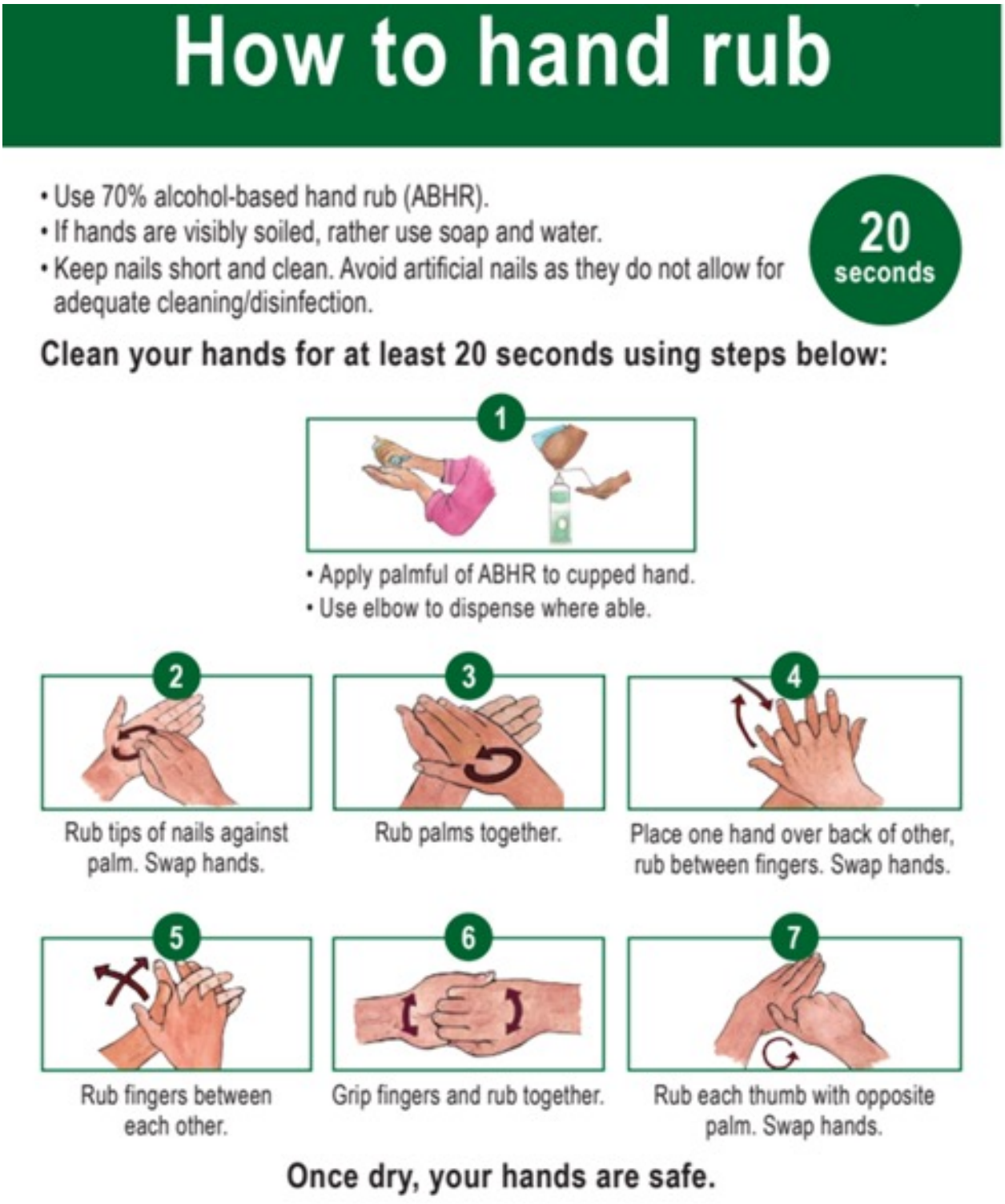
Step 5: Bottles must be thoroughly dried by inverting them upside down on a drainer or by using an air-dryer

Step 6: Each liquid soap container should be labelled with a date when refilled

[354]SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic

APPENDIX 2:

Poster on how to perform hand hygiene with an ABHR [355]



[355] SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic

APPENDIX 3:

Poster on how to wash your hands [356]

How to wash your hands

- Wash visibly soiled hands with soap and water, otherwise use alcohol-based hand rub.
- Keep nails short and clean. Avoid artificial nails as they do not allow for adequate cleaning/disinfection.

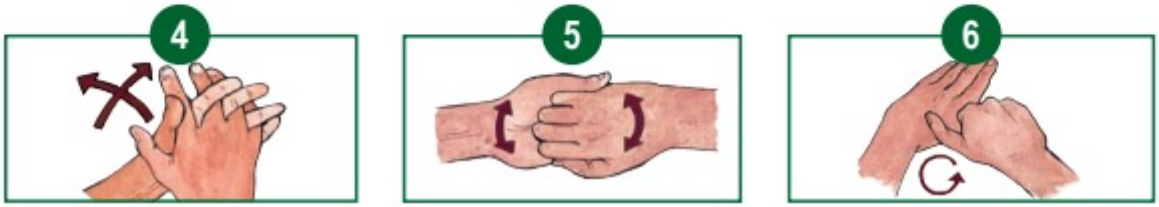
Wash your hands for 40-60 seconds using steps below:

40-60 seconds

Wet hands in clean water and apply soap to palm.

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.

Rub tips of nails against palm. Swap hands.

Rinse hands with water.

- Avoid shared towels.
- Dry using paper towel.
- Use paper towel to turn off tap.

Once dry, your hands are safe.

[356]SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic

APPENDIX 4:

Poster on surgical hand preparation [357]

[357] SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic

APPENDIX 5:

Poster on donning of PPE [358]

Put on PPE correctly (donning)

1 Clean hands for at least 20 seconds

2 Put on apron/gown

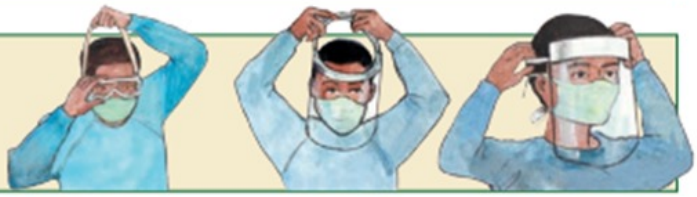
- If apron, place loop over head and tie behind back.
- If gown, cover front and tie at back of neck and waist.
- When fastening, use a bow (not a knot) for easy release.

3 Put on mask/respirator

- Secure ties or elastic bands at middle of head and neck.
- Mould flexible band to nose bridge (do not pinch).
- Ensure mask is pulled down under chin.
- If respirator, check good fit by breathing in and out: mask should move in and out with breath (air should not leak).
- If reusing N95 respirator, put on clean non-sterile gloves before replacing it. Once on face, remove gloves, clean hands and continue to step 4.

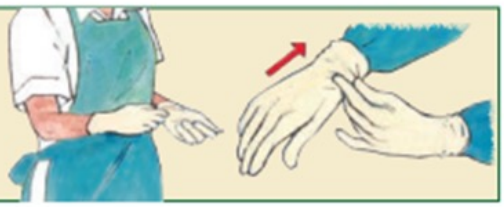
4 Put on goggles/visor

- Place over face and eyes.
- Adjust band to fit comfortably.



5 Put on gloves

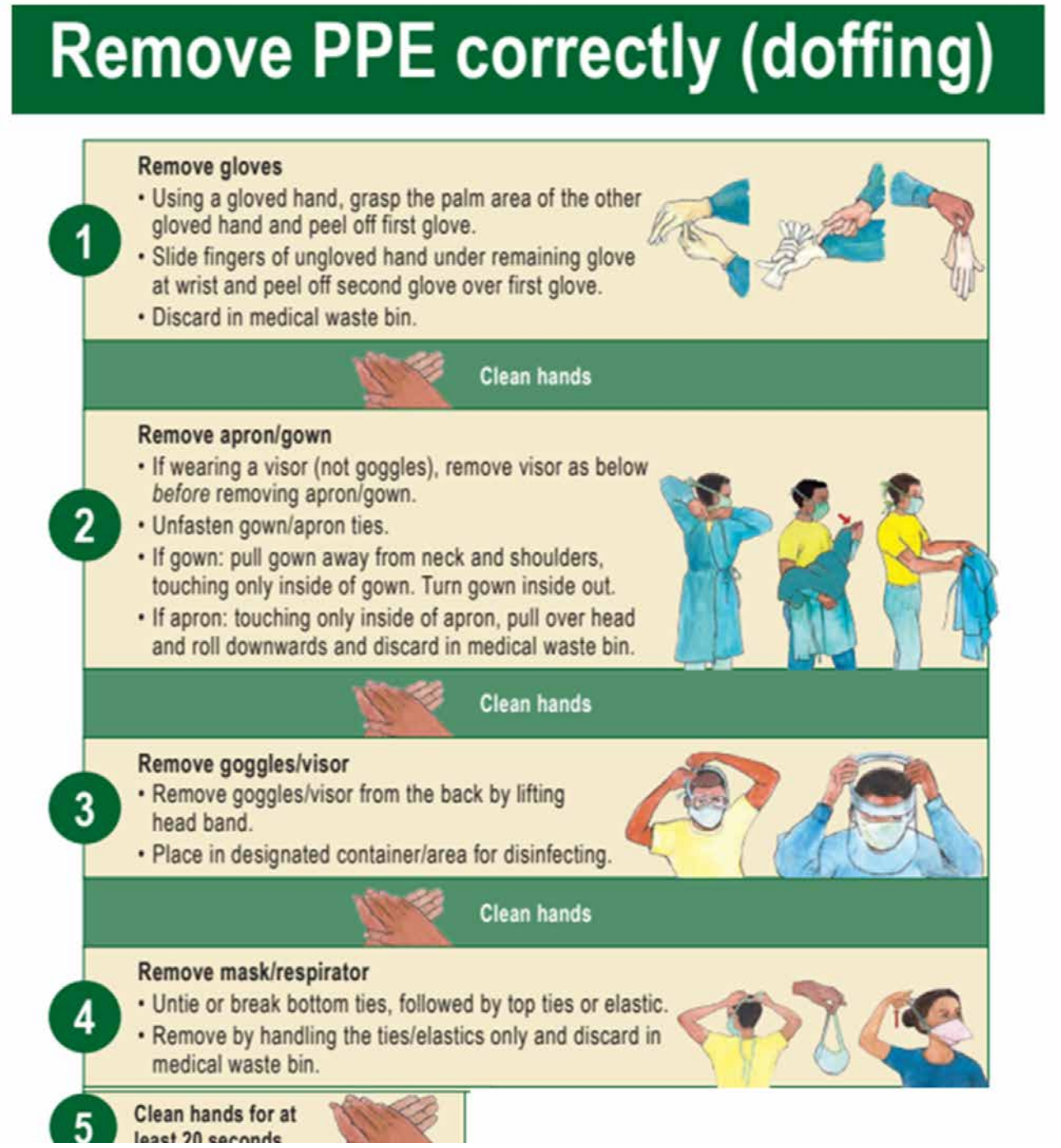
- Hold edge of glove as you pull it over hand.
- Extend to cover wrist.
- Once gloved, avoid touching other surfaces.



[358] SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic

APPENDIX 6:

Poster on doffing PPE [359]



[359] SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic

APPENDIX 7:

Poster on demonstrating cough and sneezing etiquette[359]

[360]SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-

APPENDIX 8:

Poster for waste management and disposal

Republic of Namibia

Ministry of Health and Social Services

Dispose of waste properly to protect yourself and those around you from infection, disease, and injury.

Please collect and store waste in the allocated colour coded bags for infection control purposes and cost effective waste removal and final disposal.

Soiled and Blood Stained Linen Only

Domestic/ Household Waste Only

Left Over Food Only

Infectious Waste Only

APPENDIX 9:

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 individual areas to 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 high-risk for cross-transmission because they are contaminated with 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 one daily cleaning. **See Table 1.**[361]

Table 1: Routine cleaning procedures

Area	Cleaning method	Equipment	Frequency
Floors **Continuous smooth flooring is recommended for health establishments**	**1. Static head mopping:** Remove dirt and dust on the floors before commencing with wet mopping. 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 in an appropriate bag.	Head mop or microfibre sleeve and detergent	Daily and immediately after spills, excluding blood and bodily fluids
	2. Wet mopping: 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 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 thoroughly to prevent slips and falls.		Daily and immediately after spills, excluding blood and bodily fluids

[361] SA NDoH. 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

	3. Scrubbing/stripping: 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 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 a scouring pad. The entire floor is then thoroughly mopped and dried.		Monthly
	4. Floor sealing and polishing: 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 and door handles are also washed with detergent. Mirrors are washed with non-ammoniated, streak free glass cleaner, thus ensuring that all smears are removed.	Ammonia- based detergent	Bathrooms- daily Toilets – Scheduled cleaning 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 wiped dry.	Detergent, scourer	Daily or asand / 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. 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/sterilisers should be emptied, and the bottom base removed and cleaned daily.	Water, detergent, chlorine, strength, disinfectant, cloths,	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 [362]

[362]SA NDoH. 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

APPENDIX 10:

Environmental cleaning checklist [363]

	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 1,000ppm** – this is usually two 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 - paying special attention to the following items below:***		
	Switches &and 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	356	

[363] SA NDoH. 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

APPENDIX 11:

Pest control standard operating procedure

SCOPE

This standard operating procedure will cover 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 Medical Superintendent is responsible for ensuring that there are enough resources allocated to the implementation of the pest control programme
- 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 at hospitals and twice per year at clinics and health centres
- 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 at all health facilities in maintaining a pest free environment.

IMPORTANT INFORMATION ABOUT PESTS

- Pests can serve as agents for the mechanical transmission of micro-organisms, or as active participants in the disease transmission process by serving as a vector - hey 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 programme 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" Gauze screens, 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 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 • Feed at night and hide during the day in cracks of buildings, furniture and bedding • The bite causes irritation and lack of sleep • There is no known disease spread by bedbugs	• Maintain good environmental and household hygiene ` • Repair cracks and crevices in furniture and floors • Disinfect furniture and mattresses regularly, place in sun	Report to local Health Inspector and eradicate according to Environmental Regulations General Health Regulation GN 121 of 1969, as amended
Cockroaches	• Live on decomposed organic material, especially food containing starch, sugar, meat, dairy and vegetables • Hide in cracks and holes • Feed mainly during the night They prefer heat but can survive in extreme cold and even in steam pipes and drains • They carry a variety of micro-organisms and deposit it on food and work surfaces	• Maintain good environmental hygiene • Store food in packaging material to prevent contamination • Prevent build-up of dirt by regular environmental cleaning • Continue to check for breeding grounds • Regularly destroy cockroaches, using approved insecticides.	• Do not put food in bed lockers or any other unauthorised place in hospital • Report sightings of cockroaches to the local EHP

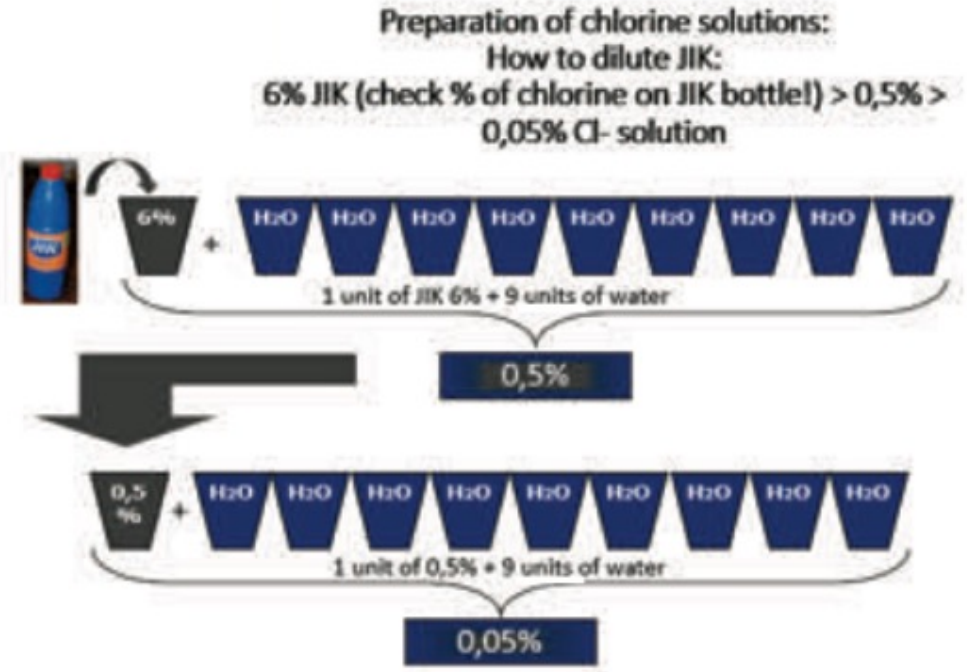
House fly *(musca domestica)*	• Can transmit pathogens from refuse to human food • It cannot digest solids, it spits a drop of moisture on food to make it easier to eat and in this process it excretes its waste matter on the food • The fly's sticky feet and hairy legs also carry micro-organisms • It can transmit diseases such as typhoid fever, poliomyelitis, dysentery, trachoma, cholera and gastroenteritis • 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 the bin • Remove garden and other waste, which cannot be placed in a refuse bin • Ensure all food and drinks are always properly covered • 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 • Refuse needs to be removed regularly from the premises • 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 • 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 • Bites are itchy, and scratching may lead to secondary infection • The human flea can transmit *Bubonic plague* and *Typhus* from rats to man and from man to man	• Maintain good environmental and household hygiene • De-flea pets regularly • Extermination of • rat should be compulsory for houses and institutions	• Use insecticide on visible fleas. • Educate community on prevention. • If ward becomes infested, remove patients and spray ward and disinfect. • Report and investigate for rodents.

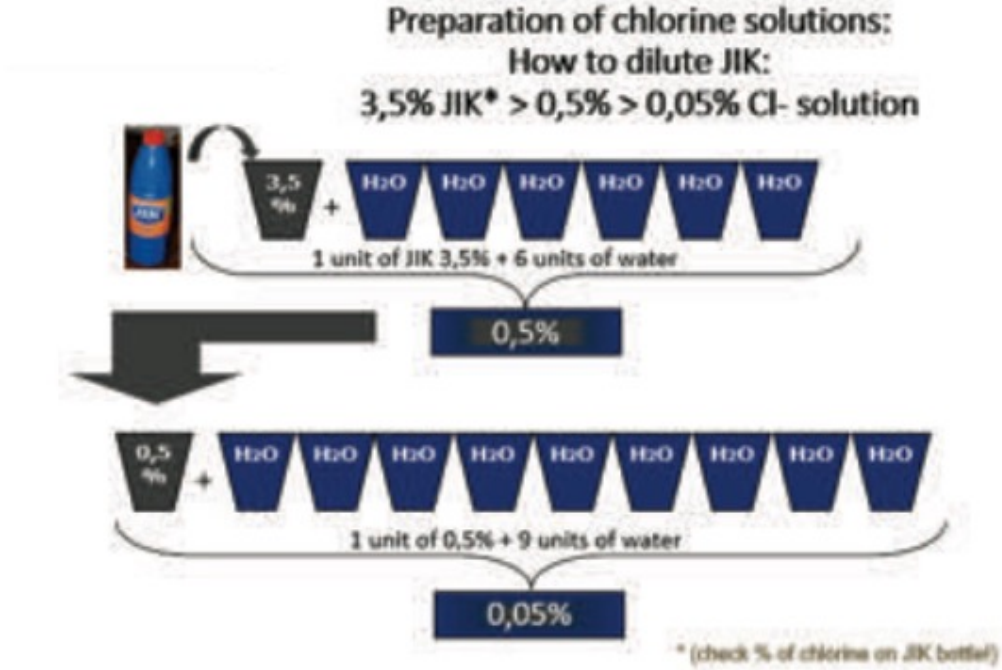
Lice *(pediculosis)* **Different species:** **Head louse** *(pediculus humanus* capitis), found on nape of neck and behind ears. **Body louse** *(pediculus humanus corporis*) found on body, axillae and around waist **Crab louse** *(phthirus pubis)* or pubic louse	• The *pediculus humanus* is about 2-3mm in size, larger than the *phthirus* and has a greyish white colour • The eggs of the louse, called nits attached to hair, gets into creases in bedding and hatches from it • Lice live on the blood of the host. The bites cause irritation and itching • Scratching may lead to secondary infection • 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* • Spread by direct contact of heads or bodies	• Inspect shared accommodation and children's hair regularly • Prevent overcrowding in schools and hostels Prevent sharing of combs, toiletries, caps and hats • Wash bedding and clothing in hot water • Children with lice infestations should not be allowed attending school until deloused, and no nits are present • Control measures are based on good personal hygiene by bathing regularly with special attention to hair as well as combs	• ***Managing lice in HCF:*** • Wear PPE • Delouse patient in a single room • Shaving hair is not necessary • Send infested linen to the laundry in a marked clear plastic bag • 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 one week Educate patient and family
Mosquitoes	• Mosquitoes breed in shallow still pools of water, and especially in damp areas with little sunlight • It may host the malaria parasite and can cause disease • Refer to the National Malaria Guideline	**Endemic areas:** ***Educate the community to:*** • Prevent mosquitoes breeding in standing water by adding a few drops of paraffin or diesel to water • 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 • Treat hospital premises with long-acting insecticides, if required • Install mosquito netting at HCFs

Rodent Control • House mouse, roof rat and the Norwegian or common rat • Wild rodents include prairie dogs, ground squirrels and the gerbil species	• Rodents can spread the plague • Other diseases that can be spread by rodents include: • Rabies (bitten by a rabid animal) • Salmonella (food eaten that is contaminated by rodent faeces)	• Notify health authorities of suspicious cases of illness or mortality of domestic or wild rodents • ***Suspected:*** Premises should be vacated, inspected and treated accordingly • Unsanitary, dilapidated buildings and premises should be vacated and demolished • Maintain good environmental hygiene and housekeeping • Regular inspection by the local Health Inspector of food premises and general stores • Remove refuse promptly according to regulations • Store food and food products in rodent proof containers	Eradicate rodents with bait and trapping

Scabies • *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 • *Classic distribution of lesions* - • Hands, particular at the webs of the fingers • Anterior surfaces of the wrists, elbows • The belt line • Genital area and breast area (in females particularly) in adults • Lesions may be found on other parts of the body	• Wear PPE when treating affected individuals Remove bedding and linen and place in green linen bag, sealed for laundry • Treat all members of the family and any other contacts • Continue to maintain good personal hygiene	• Educate the community • Maintain good personal and environmental hygiene • Avoid sharing of bedding and clothes in overcrowded conditions • Avoid contact with an infected person • Avoid scratching to prevent inflammation
Ticks	• Ticks can transmit serious diseases to domestic animals • The bite of a tick causes irritation and the wound may become infected • Ticks transmit the following diseases to man: • Tick-bite fever, spread by the hard veld tick, Relapsing fever, from lice or ticks • Crimean Congo Haemorrhagic fever, spread by the Hyalomma (bont-leg tick). • Refer to management of Viral Haemorrhagic Fever (VHF), Rocky Mountain spotted fever and Q – fever	• Wear PPE when exposed to the risk of tick contamination • De-ticking of clothes after exposure • De-ticking of domestic animals (do not allow into house or onto beds) • Use insecticides and pesticides	Take adequate precautions during possible exposure such as hitchhiking, hunting, slaughter of animals

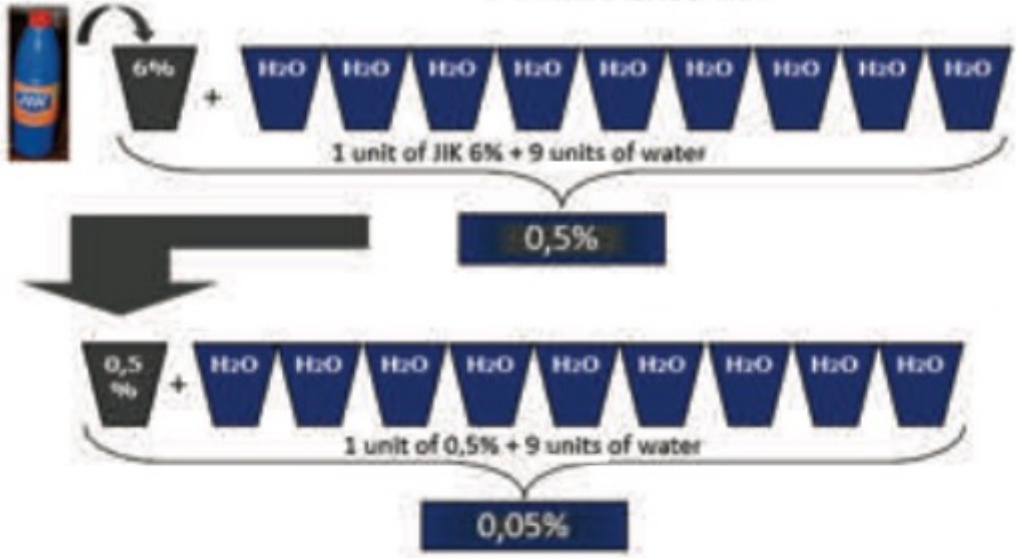
How to make up chlorine solutions of different strengths [364]



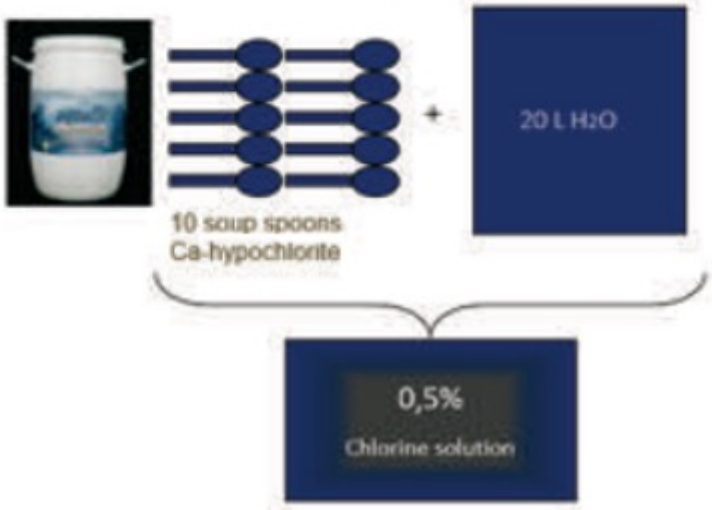


[364] SA NDoH. Practical Manual for the Implementation of the National IPC Strategic Framework. 2021. Available: https://knowledgehub.health.gov.za/elibrary/practical-manual-implementation-national-infection-prevention-and-control-strategic

Preparation of chlorine solutions:
How to dilute JIK:
6% JIK (check % of chlorine on JIK bottle!) > 0,5% > 0,05% Cl- solution



Preparation of chlorine solutions:
How to dilute calcium hypochlorite



Preparation of chlorine solutions: How to dilute calcium hypochlorite

1 soup spoons Ca-hypochlorite

+

20 L H_2O

0,05%
Chlorine solution

Preparation of Chlorine Solutions

2 tablets + 5L water = 0,05% chlorine solution

4 tablets + 1L H_2O = 0,5% chlorine solution

APPENDIX 13:

Viral Haemorrhagic Fever (VHF) protocol

(Adapted from UIPC, Tygerberg Hospital and Stellenbosch University, CT, IPC Manual, 2010)

This protocol is based on the national protocol for Viral Haemorrhagic Fevers (2003) produced by the National Institute of Communicable Disease (NICD). It has been modified to make it more user friendly for the health workers during a VHF outbreak.

This VHF protocol outlines the step-by-step measures to ensure good IPC practice when dealing with a suspected or confirmed case of VHF. Patients with VHF should be transferred to an isolation unit at a central hospital if they are stable.

Important considerations

Any health worker who suspects that a patient might have a VHF must do the following:

1. Contact the medical team on call and inform them of the suspicion.
2. Wear PPE for contact precautions, including gloves, aprons and face mask to protect your mucous membranes from splashing.
3. Isolate the patient as soon as possible - if there is no single room, move patient to a quiet area.
4. DO NOT take any blood or other samples from the patient - this must be done by the attending medical team.
5. Once the medical team has arrived, this protocol will be followed very carefully.

Case Definition

Clinical signs are non-specific with headaches, flu like illness, temperature, and malaise.

Suspicion should be aroused by:

- Additional signs and symptoms such as pharyngitis, conjunctivitis, vomiting, diarrhoea, abdominal pain, haemorrhagic manifestations or shock, jaundice or laboratory evidence of an incipient haemorrhagic state or liver failure
- Short duration and rapid progression of the disease e.g., an acute rather than a chronic illness
- Lack of evidence in the patient's history or physical examination, which excludes VHF
- Lack of evidence from laboratory tests already performed which would tend to exclude VHF, e.g., positive bacteriological blood cultures, neutrophilia suggesting bacterial infection, normal platelet and leukocyte counts.
- ***A history (or collateral history) during the three weeks (Congo fever: two weeks) prior to onset of illness of:***
  - ➟ Contact with a case of VHF
  - ➟ Residing in or visiting a tropical or rural environment
  - ➟ Contact with animals or their tissues
  - ➟ Handling of or being bitten by ticks or insects
  - ➟ Hunting, hiking or slaughtering of animals
  - ➟ Travelling to an area or country known or considered likely to be endemic for VHF (particularly if the journey combines the ingredients of rural environment and contact with animals or insects)

Steps for dealing with a suspected case of VH

- **Step 1- a clinical referral**

The referring centre will contact the infectious disease consultant on call, who will decide whether to transfer the patient to a tertiary care (central) designated hospital based on the clinical history and findings.

- **Step 2: Inform the VHF team**

The VHF team consists of the following and the table will outline the roles of each member(s) of the team:

Table 1: Team involved in VHF protocol implementation

Speciality/ discipline	Role
-Infectious disease consultant - Informed by referring centre or doctor	- First point of contact - Will inform the VHF team and arrange direct transfer of patient into an isolation ward NOT into the routine admission area - Inform the local authority of a possible case of VHF Inform the laboratory services - Follow up any previous laboratory samples that may have been sent earlier during the patient's admission
Infection Prevention and Control (IPC) practitioner will ensure that the isolation unit is prepared	***The isolation unit/ward will be prepared:*** - Open isolation ward and make sure it is clean - Put up transmission-based precautions (TBP) and IPC signs at strategic points of the isolation area- (Contact precautions with signage) **Ensure that:** - The ventilation is working (check with airflows and engineers) - Bedpan washer disinfector is working (85˚C for 3 minutes) - Use a checklist to ensure that all PPE is available. - Sign off check lists (as above) - Review protocol and IPC management structures including protocol for visitors - Keep a daily record if the patient is admitted
Nursing manager/supervisor	*Arrange extra staff if indicated by clinical condition*
Informed by ID and UIPC	***Nurses immediately to isolation area to:*** ➟ Make up the beds ➟ The room is clean and dry ➟ Ensure adequate hand hygiene facilities ➟ Sharps container next to patient's bed ➟ Procedure trolley (fully equipped) ➟ PPE for all attending staff Line list of all staff attending the patient
Clinical director responsible for ID informed by ID consultant	- The patient is transported directly into isolation - Ensure facilities are functioning - Ensure there are adequate provisions of PPE, medical equipment and staff

Laboratory services informed by ID consultant	Stand by in case of VHF being admitted - Prepare laboratory sample for transportation to the appropriate facility (NICD in South Africa) - A trained person from the laboratory must collect the samples and prepare it for immediate transport - Inform the laboratory staff that a potential hazardous sample might be arriving - Review protocol for handling such specimens
Pharmacy- Head Pharmacist informed by Clinical Director	- Mobilise pharmacist on call - Need for specialised medical treatment - Ensure adequate supplies of antimicrobials - Hand hygiene products in place - Disinfectants in place if required
Medical supplies and stores informed by Clinical Director, UIPC and Nursing Director	- Ensure provisions for IPC are in stock and PPE readily available e.g., IV systems, urinary catheters and other invasive medical devices are in good supply - Sharps containers - Plastic bags and containers for waste - Ensure that items are ready for collection
Engineering informed by IPC and Clinical Director	Prepare isolation facility for arrival of patient. ***Give a written report which includes checks on:*** ➟ Ventilation ➟ Washer disinfector ➟ Both hot and cold-water supply is working
Housekeeping and domestic staff informed by UIPC, clinical and nursing directors	-Clean the room prior to admission if necessary - Damp dust all furniture - Review protocol on daily cleaning of the room with appropriate PPE - Prepare for terminal cleaning
Kitchen Informed by nurse in charge	Special dietary requirements - review protocol

Step 3: Communication

- Lines of communication must be established and kept open
- A list of all the most recent members of the team and their contact numbers should be available on a list and updated every six months
- Admission of the patient should be communicated to everyone on the team and discharge of the patient should be communicated to everyone on the team

Step 4: Check lists

- ***Protocol file complete and updated. The checklist should include the following:***
- PPE Waste and sharps containers, medical and procedure equipment
- Laboratory samples required- colour of tubes and tests requested
- Information for the VHF information board

Once the patient has been admitted

- Set up a **VHF Information Board** which will contain all the necessary information and daily progress report
- The patient will be transported directly to the isolation room
- The clinical team will be identified, and their names and contact details will go onto the **VHF information Board**
- ***Review of VHF protocol immediately by:***
  - ID team
  - IPC unit
  - Nursing team
  - Housekeeping
  - Pharmacist
  - Medical supplies
- Go over the checklists to make sure everything is readily available and label all the necessary equipment storage areas clearly

When the patient is discharged

- Close all the files and make sure each day report has been signed
- Clean and remove the procedure trolley
- Discard unused single use items
- Removal of waste and sharps containers
- Removal of linen for washing (or discard)
- Cleaning of the room

- Isolation

The patient will be admitted directly to the isolation facility

- The patient will be admitted to a single isolation room with a hand-wash basin and ensuite facilities
- The door must always remain closed
- An intercom is desirable to prevent traffic in and out of the room
- If ensuite toilet and bath facilities are not available, then provisions for adequate handling of bedpans and urinals must be in place
- Ventilation - at least 6-12 ACH are required, negative pressure ventilation is desirable but not essential
- Engineering check must be recorded throughout the patient's stay
- Washer disinfector for the ward must be checked and its performance recorded
- ***The following will be placed in the isolation room:***
  - Clinical waste containers
  - Sharps container on the wall but also on the procedure trolley
  - Procedure trolley containing all the necessary equipment to take blood safely, put up intra-venous fluid administration, wound dressings, sterile cotton wool, gauze dressings
  - Thermometer placed in a dry container
  - Alcohol rub must be placed near the patient's bedside

Personal ProtectiveEquipmentprotective equipment

Wear PPE FROM THE PACK PROVIDED ONLY IF ENTERING THE ISOLATON ROOM - DISCARD INSIDE THE ROOM!

If the patient has no signs of bleeding or coughing

- Surgical masks with visors worn properly with ties fastened in place
- Plastic aprons
- Gloves well-fitted latex - double gloving may be required
- Own shoes acceptable or change to theatre clogs - overshoes not recommended
- Head gear not recommended

If the patient is bleeding or coughing

- N95 respirators- fitted to face by pushing down and sealing nasal and face contours
- Eye shields/visors recommended
- Waterproof gowns
- Latex gloves - long cuff to go over the gown sleeves - double gloving - change out of personal shoes into clogs - NO overshoes
- Head gear if expecting blood splashes

Procedure equipment list

The nurse in charge must check this list with another nurse and sign off the contents of the procedure trolley:

Table 2: List of equipment required for the procedure trolley

For taking blood samples or putting up IV infusions	Number of each	Responsible person
Vacutainer needles of different gauges	10	
Bull dog barrels	10	
Hypodermic needles 16to-20 gauge	10	
Syringes, 2ml, 5ml, 10ml, 20ml	10	
Needle less systems for mixing drugs in multi-dose vials	5	
Needle less injection ports for IV lines	10	
Intra venous cannula - different gauges	5	
Butterfly needles with tubing	5	
Administration set with luer lock (loose sleeve) (not bayonet) and with no open injection ports	3	
Burette to add medication	1	
Tourniquet	2	
Alcohol swabs for skin site cleaning	1 box	
Cotton wool balls	1 packet	
Sterile gauze	10	
Transparent dressing for iv sites	5	
Micropore tape	1 roll	

Make sure stocks of medical supplies are always topped up!

- Lay up the procedure trolley with the necessary equipment and take into the room
- After use, remove from the room, discard all items that have been opened or used and leave the rest in case of future use
- Clean the trolley with detergent and water, dry and wipe over with alcohol
- Repack after the trolley is dry

Keep all other equipment outside the room to avoid contamination:

- Emergency trolley
- Central line packs
- Urinary catheters
- Endo tracheal tube
- Endo tracheal suction catheters

RECOMMENDED PPE FOR VHF UNIT

Table 3: PPE and the indication for their use

ITEM	INDICATION FOR USE	WHO SHOULD WEAR IT
Scrub suit and closed footwear preferably boots	Suspected or confirmed case of VHF admitted to isolation. Change clothes when entering isolation facility	• **All** staff entering or visiting the isolation facility • If remaining in the ante area, no further PPE is required
Surgical face mask with visor SINGLE USE ONLY	Not routinely indicated - may be considered if the patient has bleeding into respiratory tract with respiratory symptoms	• Team dealing directly with patient- in close contact • Staff transporting patient • Visitors • Patients transferring in and out of isolation
N95 respirators REUSE BY SAME HEALTH WORKER FOR ONE SHIFT ONLY	Not routinely indicated. May - may be considered if the patient has bleeding into respiratory tract with respiratory symptoms	Team dealing directly with patient - close contact
• **Latex gloves** - Well fitting, non-sterile • Sterile if procedure indicates OR • Nitrile gloves	When direct contact with the patient, handling bedpan or urinal	• Health worker Cleaners • Anyone in close contact with blood and body fluids • Wash hand thoroughly after removal of gloves
Water resistant disposable gown - Discard after each Use	When entering patient's room for clinical procedure	Team in direct contact with patient
Plastic apron - To protect clothes from splashes	When entering the patient's room but no direct contact with patient	Those not in direct contact with patient • Visitors • Administrative staff
Head gear	Not recommended unless bleeding and splashes expected	Attending staff
Foot covers	Not recommended - change shoes	Attending staff

Laboratory tests required

- As soon as VHF is suspected, the clinician should determine what laboratory tests have already been performed or are in progress.
- All specimens should be traced, and **the laboratory manager** informed of the suspected diagnosis to allow them to take the necessary precautions.
- As few as possible laboratory staff should be exposed and standard operational procedures (SOP) must strictly be adhered to.

Table 4: Laboratory tests required for a case of VHF and the recommended blood specimen bottles

Test	Amount of blood	Colour of tube
To exclude NON-VHF diseases		
- Blood smear to exclude blood parasites - Full blood count, diff and peripheral smear	5ml 10ml	Purple top x 3
Liver function tests sero-diagnosis for other Infections	5ml 10ml	Yellow top x 3
DIC screen	5ml	Blue top x1
Blood culture (1 set)	10ml per bottle	Blood culture bottle X2
To exclude VHF Diseasesdiseases- send bloods to NICD Special Pathogens Unit		
Serological tests for VHFs	10ml	Yellow top x 2
PCR for confirmation of VHF diseases	10ml	Purple tops x 2

Signage placed on the doors and entrances

VIRAL HAEMORRHAGIC FEVER
CONTACT + DROPLET PRECAUTIONS IN PROGRESS DO NOT
ENTER WITHOUT PERMISSION

VHF Precautions in Progress
Date started: **Date ended:**
Change into YELLOW GARB for entry and movement around isolation facility
PPE is not required in the following areas

- **Corridors**
- **All rooms except isolation room**
- **Offices & administration areas**
- **Laundry and storage areas**
- **Sluice**
- **Pharmacy and medical stores**

If you are entering the isolation room follow the safe instructions on PPE use and use the IPC pack provided

APPENDIX 14 (A):

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 Ttransportation	Reason
Blood culture	• Aseptic technique required • If blood drawn required for multiple tests, inoculate B/C bottle first • 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 - do 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 that kill bacteria
Endotracheal aspirate (ETA)	Only take if infection/sepsis suspected.	• Results usually reflect bacterial colonisation and are unreliable • 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-5mm of anterior nares (nose) and hairline.	*S.aureus* carried in nose and 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 • Send sample in a sterile screw-capped container	• Avoid contamination • Prevent leakage /contamination
Serology	Sterile sample in appropriate container.	Contamination leads to haemolysis
Sputum	• Early morning specimen preferred • 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 • Tissue for virology needs to go into viral transport media	• Contaminants can give false serological results • Viral transport media helps keep fragile viruses alive

APPENDIX 14 (B):

SOP: 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 must 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. Specimens should be transported to the laboratory promptly. They need to be placed in an incubator (in the lab) as soon as possible.

1.1 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: Three sets (from three different sites taken 30 minutes apart (note, these do not need to coincide with fever spikes).

Pyrexia of unknown origin: Send one set initially. Send a further two sets during fever spikes ideally 24-36 hours after the initial set. Sending more than four sets does not increase the yield of positive cultures significantly.

Patient on antimicrobial therapy: It may be necessary to take sets on three consecutive days or take blood into a resin blood culture bottle to remove antimicrobial agents.

1.2 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 per bottle

1.3 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

1.4 Specimen collection- the method

Equipment needed:

- 70% isopropyl alcohol (biotaine) 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 missed venepuncture)

- Sterile cotton wool balls
- Sterile gloves
- Tourniquet
- Facility for hand hygiene (soap and 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

1.5 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.

1.6 Specimen transport

Specimens should be transported to the laboratory promptly or some organisms which are sensitive to temperature and atmospheric changes may die.

APPENDIX 14 (C)

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

- ***Equipment 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 transportation

Transport IV catheter tips to the laboratory as soon as possible after collection to prevent the tip from drying out and the bacteria dying.

APPENDIX 14 (D)

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 containe.
- 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
- 20-30ml 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 eight hours or take the sample before breakfast
- Prepare nebuliser with 20-30ml of hypertonic saline (3-5%)
- Patient needs to inhale the mist from the nebuliser for 10-20 minutes - give one or two 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.

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 the 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 in a closed space like in the toilet area)
3. Take two 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 to obtain more accurate results

APPENDIX 14 (E)

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 the subsequent prompt delivery of urine samples to the designated 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 of 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 - 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 two 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, and 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-public 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 two 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. 1Sterile urine collection container (will be given to you by your nurse/doctor)
2. Soap and water
3. A label is provided for your name and details to be written, as well as for the time and date you take the sample
4. Request form

How to take a sample if you are female:

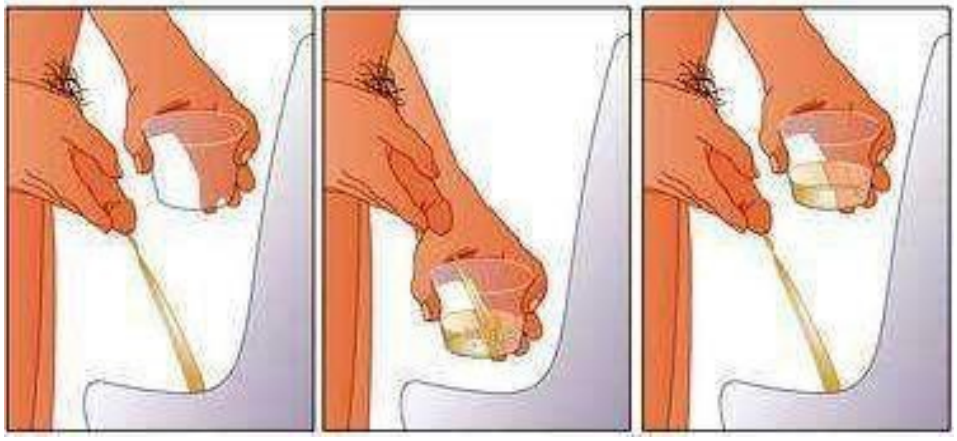
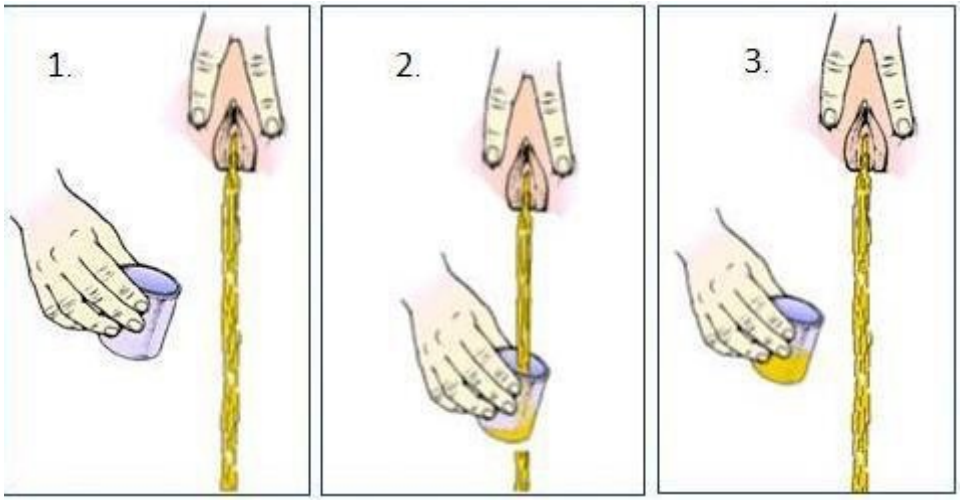
1. Wash hands thoroughly with soap and water
2. Separate the skin folds around the urinary opening - wash area with a soap and water using a front to back motion, and repeat two additional times
3. Begin urinating into the toilet with skin folds held apart with the fingers
4. Insert collection container into urine stream without allowing container 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 *as soon as possible* 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: 1. 1Start urinating 2. Place the pot in the stream till it is half full 3. Finish urinating	
Females: 1. Start to urinate 2. Place the pot in the stream till it is half full 3. Finish urinating	

APPENDIX 14 (F)

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 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 is 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 the container, the specimen will be rejected for processing

Patient instruction

Patient linstruction

What you will need to take a faeces sample:

1. 1Sterile 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 - 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 on 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 - this helps the laboratory get more accurate results

APPENDIX 15

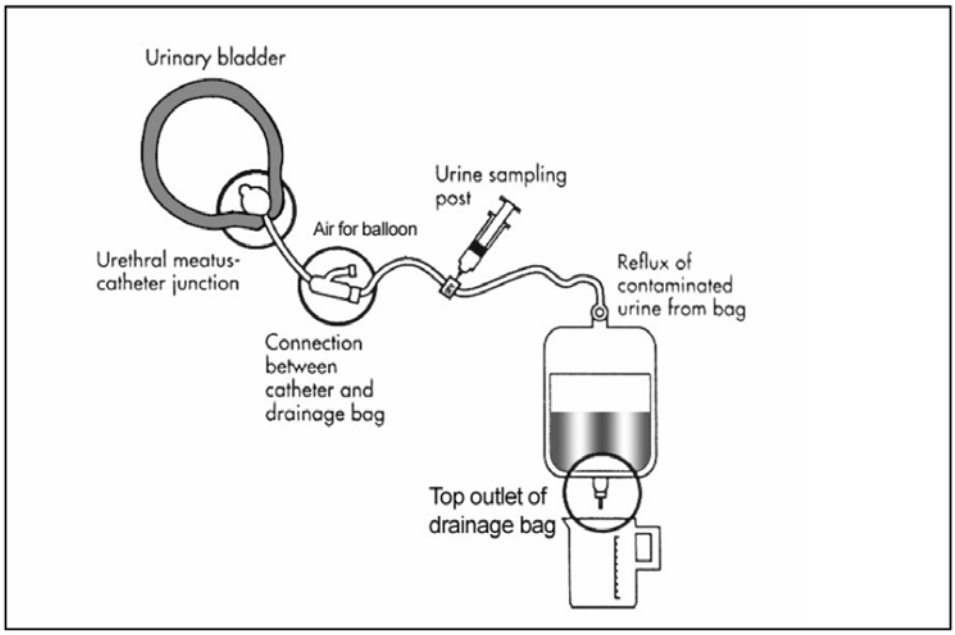
SOP: Urinary tract catheterisation

Urinary tract catheterization is an aseptic procedure and a closed system must always be maintained. It is the most common 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.

1.1 Entry points for bacteria

Bacteria, both endogenous and exogenous bacteria 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.

FIGURE 1: POINTS OF ENTRY FOR BACTERIA INTO THE URINARY TRACT



Procedure for urinary catheterisation

- 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 is necessary
- Select the appropriate size and type of catheter to avoid trauma to the patient
- Before starting, check that all the necessary equipment is present, sterility maintained, perform hand hygiene and wear sterile gloves

1.2 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

1.3 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 and 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 10cm 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
- 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

1.4 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.

1.5 Risk Reduction strategies

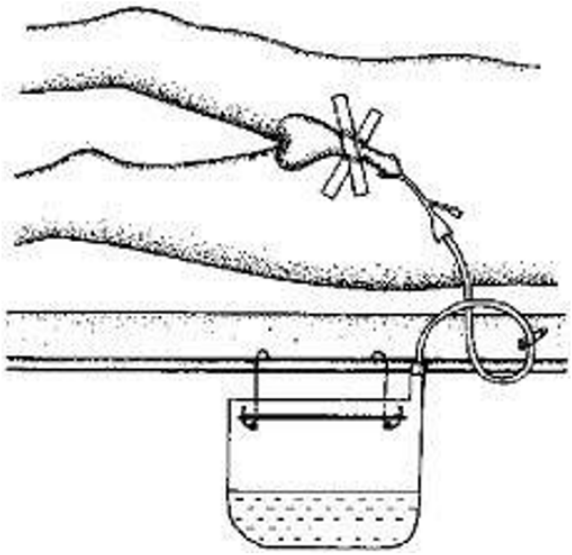
1.5.1 Filling the balloon

Use sterile water to fill the catheter 5cc balloon with about 10cc 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 two weeks and fluid added as needed.

1.5.2 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).

1.5.3 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.

1.5.4 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.

1.5.5 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 must be maintained. It should be noted that petroleum-based creams or ointments can degrade latex catheters and should be avoided.

1.5.6 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.

1.6 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

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 six-hourly		
6. Mobilise patient to improve lung functions		

Name of auditing staff: .....

Signature: .....

Date and 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 chlorhexidine 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 and time: .....

CLABSI (CENTRAL LINE ASSOCIATED BLOOD STREAM INFECTION) PREVENTION BUNDLE

Item	Yes/no	Comment
1. Optimal insertion site chosen (subclavian, internal jugular, femoral). Circle) - circle which is appropriate.		
2. Perform hand hygiene		
3. Sterile technique 3.1 Sterile gloves, surgical mask, cap and sterile gown 3.2 Draping of the patient 3.3 Sterile CVP pack used		
4. Chlorhexidine skin disinfectant: area is allowed to dry prior to insertion		
5. Line secured		
6. Protective dressing clean &and intact: moisture permeable dressing		
7. Review necessity daily and record, remove lines promptly when no longer needed.		

Name of auditing staff: .....

Signature: .....

Name of doctor: .....

Date and time:. .....

SSI (SURGICAL SITE INFECTION) PREVENTION BUNDLE

Item	Yes/no	Comment
1. Chlorhexidine bath done pre-operatively		
2. 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 3.1 Clipping 3.2 Depilatory removal 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 and time:. .....

Signature: .....

Surgeon/anaesthetist: .....

APPENDIX 17

Terms of reference of the Infection Control Committee

Responsibilities of infection control management

MINISTRY OF HEALTH – Quality Assurance Unit

Key person is the head of the unit (Deputy Director) who is responsible for developing policies and guidelines for infection control

- Review policy and develop Standard Operating Procedures
- Ensure effective management and control arrangements at different operational levels in MOHSS
- 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 specialises 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 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 – regional management level

Key person should be the Regional Director.

- 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 for the National Quality Assurance Unit
- Appoint or allocate a focal person at regional level to manage, coordinate and support activities at district level
- Ensure surveillance and monitoring at district 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 – District management level

Key person should be the Senior Medical Officer at the district hospital

Provide specialist IPC support to the district management team and nurses in charge of district 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 regional 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
- Contribute to the annual review of infection control guidelines - hospital infection control team members
- Medical practitioner - assigned for infection control Nursing Manager in charge of hospital
- Infection Control Nurse/Nurse assigned to infection control risk assessment and management and quality assurance
- Ensure availability of supplies at all levels
- Functions of the Hospital Infection Control Team

Team authority to always facilitate appropriate programme functions.

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

Hospital Infection Control Committee core members

- Medical Practitioner in charge of the hospital
- Medical Practitioner / practitioner assigned to Infection Control
- Nursing Manager in charge of hospital
- Infection Control Nurse/ nurse assigned to 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, sterilisation etc.)
- Prioritise needs and develop a strategic plan (three-five 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 - scrutinise and approve infection control reports for submission to regional and national level

Role of the Nursing Manager (district 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 A nurse formally trained in infection control, able to provide specialist and appropriate guidance to health care workers in the hospital and district 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 monthly
- Conduct regular meetings with link nurse to identify issues of concern and support nurses in addressing such issues effectively
- Maintain infection control equipment inventory. Ensure compliance with local and national guidelines
- Liaise with relevant district health structures and others where appropriate

Role of Nurse Unit Manager

- Maintain hygienic conditions in the unit, consistent with infection control policies and guidelines
- Monitor aseptic techniques, including hand washing and isolation practices
- Maintain adequate supply of infection control related supplies and materials in the unit
- Ensure that all health workers adhere to infection control practices at all time - report suspicion and evidence of infection promptly and implement isolation precautions immediately
- Ensure and monitor appropriate cleaning and clinical waste disposal and management by all staff

Role of the Infection Control Link Nurses

- Act as a resource person and liaison officer with the Infection Control Link 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 the ward or 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 ICN 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 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, the safe use of equipment, and take 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 Department

The management of maintenance department must be conducted in close collaboration with the Administrative ***Officer of the hospital, who should coordinate functions will relevant departments and be responsible for:***

- Regular inspection of buildings for plumbing, heating, ventilators and cooling system faults/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 any anticipated interruption of services such as plumbing or air conditioning

Role of Central Sterilisation Services Department (CSSD)

This department serves all hospital areas with sterile supplies, including the OT. ***The person managing the unit should have knowledge and experience of medical supplies and equipment - the unit must:***

- Clean, decontaminate, test, prepare for use and store all sterile hospital equipment
- Develop and monitor policies on sterilisation methods, according to type of equipment
- Ensure optimum sterilisation conditions (temperature, humidity, duration and pressure)
- Ensure appropriate cleaning and decontamination of re-usable equipment, including wrapping procedures

The CSSD Manager is responsible to:

- Oversee the use of different methods to monitor sterilisation processes
- Ensure regular technical maintenance of equipment according to standards and manufacturers requirements. Report any defective equipment timeously
- 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 18

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 diagnosis
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:	Micro-organism cultured:
Etiological agent/micro-organism 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:
Micro-organism 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/micro-organism cultured:	
Antimicrobial resistance profile:	
Antimicrobial sensitive profile:	

IPC practitioner name:

Signature:

Date:

Denominator

Name of the hospital:

Ward:

Date/month/year	Number of patients with CVC	Number of patients with indwelling urinary catheter	Number of patients with peripheral line	Number of patients with mechanical ventilation	Number of patients receiving surgery
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					
31.					
Total					

HAI data collection report table

Ward name:	Number of CAUTI	Number of BSI (CLABSI and PLABSI)	Number of SSI	Number of VAP	Antimicrobial resistance profile

Compiled by:

Date:

APPENDIX 19

SOP: Kitchen (food handling safety)

Inadequate provision for hazard control of food might have a seriously negative impact on patients. The IPC team must be part of the quality assurance monitoring and implementation programme and do regular audits to ensure that the kitchen functions optimally.

HCFs accommodate vulnerable populations who must be provided with safe, nutritious food that will not cause harm. Kitchens and food preparation areas are potential sources of food poisoning, and outbreaks can occur which originate from the staff, preparation and storage of food, transportation of prepared food and during distribution.

1. Layout and workflow

Kitchens should be easily accessible for deliveries and removal of waste. There should be adequate space for equipment receiving, preparing food items and delivery. No special ventilation is required but provision must be made for the removal of steam from the cooking area.

The kitchen should have the following clearly demarcated areas:

- ***Staff facilities:*** Changing areas for staff when coming on duty and leaving work should be provided with lockers, hand hygiene area, toilets and showers. Rest areas and staff dining room, cleaners' room and an office and workstation for managers should be available
- Receiving and delivery areas: There should be a separate area for the reception of raw products
- ***Storage areas:*** There must be provision for cold storage (4 °C) and freezers (–20 °C) and should include storage areas for cooked and uncooked food
- Preparation and handling areas for cooked and uncooked food should be segregated and should have staff dedicated to work at one station per shift. Designated areas for different religions must be catered for
- Cooking facilities
- Cleaning and washing area for cooking utensils, cutlery and crockery from the wards
- Serving and delivery of meals will require a holding area for hot/cold food trolleys with electric points
- Continuous supply of hot and cold water for washing of utensils, serving equipment and crockery
- Adequate handwash facilities

2. Storage of raw products before preparations

- Food must be stored at the correct temperature in places free of contamination
  - ➟ Freezers should be kept at a minimum temperature of –18 °C
  - ➟ Refrigerators at no higher than 4 °C
  - ➟ Temperatures should be monitored and recorded daily, and any abnormalities reported to the supervisor
- The storage area should be clean, cool, airy and secured
- Various food groups can be stored in similar conditions
- An expiry date should be clearly visible
- Tinned products should be checked for dents, bulges or leaks as well as expiratory dates
- Dry rations such as flour and pulses should be stored in airtight containers
- Vegetables should be placed in racks and stacked to allow adequate air movement between the racks - use a system of 'first in first out'

- Meats, both cooked and uncooked, should be refrigerated and kept separately in different sections
- Dairy products should be refrigerated as soon as possible

1. Designated preparation areas

If uncooked and cooked food are prepared in the same area, using the same knives or utensils and surfaces, cross-contamination occurs and can result in transmission during cooking or food distribution. Cold foods and salads are prepared separately for the same reasons. Milk, cream and other dairy products and cold desserts can become contaminated by the surfaces or from the hands of food handlers. To reduce the risk of cross-contamination, each type of food should be prepared in a separate demarcated area with distinct colour coding if possible.

2. Food safety measures

Food must be stored appropriately and immediately on receipt. The following precautions should ensure that the food is safe for human consumption:

- Meat and poultry should be thoroughly cooked
- Reheated food should be heated to a minimum of 70 °C and served within 15 minutes of reheating
- Food may be reheated in the microwave, but care should be taken to ensure that the food is thoroughly heated.
- Liquids should have reached boiling point
- Cooked food is stored below 5 °C within 90 minutes of cooking and never more than two hours after cooking
- Food should be thawed slowly and should not be refrozen after thawing

3. Food delivery to wards

Food for hospital patients usually includes both cooked and uncooked food. The following recommendations should be taken into consideration:

- Food should be transported in clean, closed containers and closed food trolleys
- Hot food should be transported over 63 °C
- Cold food should be transported below 10 °C

4. Washing of crockery and cutlery

The washing of crockery and cutlery is of critical importance to minimise the risk of infection. The following precautions should be implemented to prevent contamination:

- Containers for food transportation should be cleaned in the washing-up area after each meal
- Utensils should be washed at a minimum temperature of 55 °C, ideally 80 °C for one minute (automated washing)
- Eating utensils washed at ward level or in the kitchen should be washed in very hot water and dried thoroughly before storage
- Domestic gloves should be worn
- Clean, hot water should be used with liquid detergent
- It is preferable to use a two-sink system, but if not available, then use running water to rinse - all food and kitchen utensils should be air-dried after washing
- Tea towels should not be used because there is a risk of cross-contamination.

5. Cleaning of the catering area

Trained cleaning staff should be responsible for environmental cleaning of the kitchen.

The following points should be taken into consideration:

- All the drains should be covered with vermin-proof wire mesh.
- Service areas, floors and surfaces should be washed daily with a neutral pH detergent and wiped over to dry.
- Floors should be cleaned at least twice a day.
- Surfaces must be wiped clean and disinfected with chlorine after each food preparation session.
- Surface disinfection with a chlorine-releasing agents containing 250ppm of available chlorine or other accepted disinfectants should be applied after thorough cleaning.
- Spillages should be cleared up immediately.
- The kitchen should have its own colour-coded cleaning equipment for clean and dirty areas.
- Kitchen equipment must be dismantled, cleaned thoroughly (manually or mechanically) and inspected for removal of all organic matter and stored dry.

6. Hand hygiene

- Handwash basins with elbow operated taps, liquid soap and paper towels must be available in all clean-up areas, preparation, cooking and serving areas.
- Staff in food preparation and serving areas should not be more than 6m from a handwash basin.

7. Kitchen waste

Kitchen waste should be stored properly in closed containers. Returned, cooked food, ideally should be discarded. The waste area should be kept clean and dry. The area should be secured, as well as rodent and insect free.

8. Pest Control

- Doors leading directly from the kitchen to the outside should be fitted with a fly screen door with a self-closer.
- See appendix on pest control regarding more detail.

9. Staff health

- Immunisation such as Hep A, should be provided for catering staff.
- All diarrhoeal disease, skin lesions or family history of gastroenteritis should be reported to the occupational health department for advice and treatment.
- Uniforms for the kitchen staff should be provided.
- Personal protective equipment includes:
  - ➟ Overalls or plastic aprons
  - ➟ Headgear
  - ➟ Footwear (boots or similar)
  - ➟ Non-sterile disposable gloves
- Food serving equipment such as tongs should be provided

10. Monitoring and evaluation

Regular inspections of the premises and catering practices should be carried out by the Environmental Health Officer, Pest Control Officer and the IPC practitioner/team. A standardised audit tool can be used to evaluate the kitchens and offer advice on improvement.

In addition to environmental cleaning and adherence to processes the following should also be monitored:

10.1 Temperature control

Kitchen, fridge and freezer temperatures must be monitored daily and recorded. A log of daily temperatures must be visibly displayed on the fridge or freezer for inspection.

10.2 Food samples

A small sample of the food prepared and distributed is kept daily for microbiological analysis, for at least 48 hours in case of an outbreak. ,

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