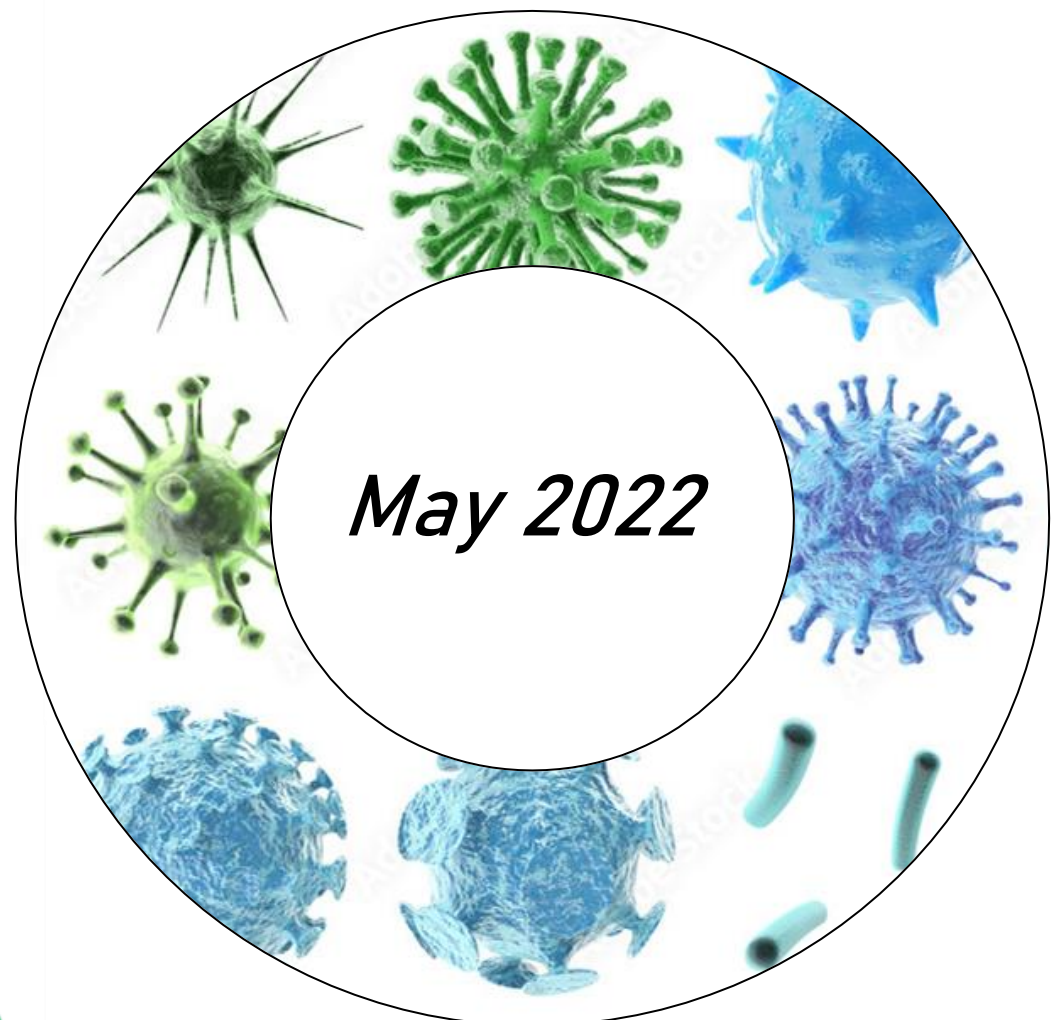




GOVERNMENT OF SIERRA LEONE  
MINISTRY OF HEALTH AND SANITATION

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# National Infection Prevention and Control (IPC) Guidelines



# Sierra Leone

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# National Infection Prevention and Control (IPC) Guidelines



**MINISTRY OF HEALTH  
AND SANITATION**  
GOVERNMENT OF SIERRA LEONE



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## Foreword

Infection prevention and control (IPC) is globally acknowledged as a vital component of a comprehensive approach to patient and healthcare worker safety, quality improvement, and improved health outcomes. The evolving landscape of emerging infectious diseases necessitates increased awareness and attention to IPC. A strong health system, which includes a culture and infrastructure of IPC, will equip the government and communities to respond to and manage public health events of concern including infectious diseases and outbreaks, and will prevent the spread of infectious diseases including healthcare-associated infections (HAI). The 2014 Ebola virus disease outbreak in West Africa accelerated efforts to strengthen health systems in Sierra Leone, including the establishment of a Ministry of Health and Sanitation (MoHS)-led National IPC Unit and the development of national guidelines on IPC (1st edition 2015).

In the light of the restoration of health system to its full capacity to cope with various public health events, IPC is included during healthcare provision in deferent medical specialties and also in response to global efforts to combat antimicrobial resistance. IPC is one of the most important strategic pillars for capacity building under International Health Regulations (IHR) and the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic of 2020. Sierra Leone MoHS has updated the National IPC Guidelines to provide comprehensive and standardized recommendations for an improved and sustainable IPC culture and infrastructure in Sierra Leone. These guidelines reflect international norms and standards published in the years since 2015, thus ensuring a solid evidence base for all recommendations.

In Sierra Leone, a comprehensive IPC system with national evidence-based and regularly updated IPC guidelines and strategies is critical to ensure IPC practices and procedures are implemented and adhered to with the aim of reducing HAIs, achieving best health outcomes, and preventing future outbreaks.

Evidence and lessons gathered from the SARS-CoV-2 pandemic, the 2014-2015 Ebola outbreak and several IPC assessments done by MoHS and partners highlight vulnerabilities at every level of the healthcare system, which relate to IPC infrastructures and practices that contribute to the ongoing threat to the health and safety of patients and healthcare workers, including the threat of HAIs. These National IPC Guidelines, containing recommended standards, instructions and practices for patient and healthcare worker safety, are an important component of a comprehensive national IPC strategy to enhance patient and healthcare worker safety.

I would like to thank the Directorate of Health Security and Emergencies, WHO, CDC and all Institutions who have been involved in the process of development and updating these important guidelines.



Mrs. Princess Dugba  
Honourable Deputy Minister of Health and Sanitation  
Freetown, 17th May, 2022

## Acknowledgements

Infection Prevention and Control (IPC) is critical to addressing the threats of epidemics, pandemics and antimicrobial resistance (AMR), which is now recognized as a major threat to health security in all countries. The Ebola virus disease outbreak of 2014-15 provided an opportunity to establish an IPC system in Sierra Leone, with the setting up of national IPC structure, district and health facility structures and the development of national IPC guidelines and the establishment of an active network of IPC focal persons in health facilities across the country. The growing emergence of antimicrobial resistance (AMR), with the threat of the spread of resistant infections in healthcare, has further underscored the urgency for comprehensive implementation of IPC Programmes in coherence with other public health services and interventions. The implementation of evidence-based infection control measures needs more public health actions and organizational control for universal application and compliance of evidence-based prevention, behavioural change, risk management, standardized surveillance methods and generation of more reliable estimates of the burden of HAI.

This guidance builds upon the first national IPC guidance (2015) written in conjunction with MoHS, WHO Country Office (WCO) Sierra Leone, WHO HQ and CDC experts, among others. The Government appreciates the financial and technical support provided by the World Health Organization (WHO) and the Centre for Disease Control (CDC). Special thanks to all stakeholders who supported in reviewing and revising the 2015 National IPC guidelines and ensured that the contents are in keeping with evidence-based practices.

Finally, the Ministry expresses its appreciation to the Directorate of Health Security and Emergencies, and all other individuals and institutions who continue to work tirelessly towards improving the safe delivery of health care services to the people of Sierra Leone. There is now an urgent need to consolidate gains made so far and ensure IPC capacity is enhanced in line with the International Health Regulations (2005).

  
Dr. Sartie Kenneh  
Acting Chief Medical Officer  
Ministry of Health & Sanitation



## Sources

The guidelines have been updated in accordance with international best practice guidelines and standards where available, with a focus on WHO Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level (2016) and WHO Minimum Requirements for infection prevention and control (IPC) programmes (2019).

Other WHO guidelines used to inform development include: WHO Global guidelines on the prevention of surgical site infection (SSI) and SSI tools; WHO Decontamination and Reprocessing of Medical Devices for Health-care Facilities; WHO Guidelines for the prevention and control of carbapenem-resistant Enterobacteriaceae, *Acinetobacter baumannii* and *Pseudomonas aeruginosa* in health care facilities; WHO COVID-19 interim guidance & other relevant guidance; WHO Infection prevention and control during health care when coronavirus disease (COVID-19) is suspected or confirmed. Interim guidance 29 June 2020;

WHO Cleaning and disinfection of environmental surfaces and waste management in the context of COVID-19; WHO water, sanitation and hygiene facility improvement tool, Interim guidance 15 May 2020. WHO IPC training modules have also been consulted.

The CDC/ICAN Best Practices for Environmental Cleaning in Healthcare Facilities: in Resource-Limited Settings.

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

## List of Abbreviations

Abbreviation	Definition	Abbreviation	Definition
ABHR	Alcohol-Based Hand Rub	ICAN	Infection Control Africa Network
AC	Advisory Committee	ICU	Intensive Care Unit
ACIP	Advisory Committee on Immunization Practices	IHR	International Health Regulations
AFB	Acid-Fast Bacillus	IV	Intravenous
AGP	Aerosol generating procedures	LCBI	Laboratory-Confirmed Bloodstream Infection
AHBR	Alcohol based hand rub	LMIC	Low-To-Middle-Income Country
AIDS	Acquired Immunodeficiency Syndrome	LTBI	Latent Tuberculosis Infection
AIIR	Airborne Infection Isolation Room	MDR	Multi Drug Resistant
ALT	Alanine Transaminase Test	MERS	Middle East Respiratory Syndrome
AMR	Antimicrobial Resistance	MMR	Measles Mumps Rubella
ARV	Antiretroviral	MOHS	Ministry Of Health and Sanitation
ASA	Anaesthesiologists	MRSA	Methicillin-Resistant <i>Staphylococcus Aureus</i>
BAMT	Bio Medical Admissions Test	MTB	<i>Mycobacteria Tuberculosis</i>
BBP	A Blood-Borne Pathogens	NAP	National Strategic Plan
BBV	Bloodborne Infections	NCU	Neonatal Care Units
BSI	Bloodstream Infection	NGO	Nongovernmental Organization
CAP	Community Acquired Pneumonia	NIOSH	National Institute for Occupational Safety and Health
CAUTI	Catheter Associated Urinary Tract Infections	PHU	Peripheral Health Unit
CDC	Centre For Disease Control	PICC	Peripherally Inserted Central Catheters
CHX	Chlorhexidine	PPE	Personal Protective Equipment
CLABSI	Central Line Blood Stream Infections	RNA	Ribonucleic Acid
CMO	Deputy Chief Medical Officer	RUP	Reusable prevention
CMS	Central Medical Stores	SAP	Surgical Antibiotic Prophylaxis
CNMO	Chief Nursing and Midwifery Officer	SARS	Severe Acute Respiratory Syndrome
CRAB	Carbapenem-Resistant <i>Acinetobacter Baumannii</i>	SDS	Safety Data Sheets
CRE	Carbapenem-Resistant Enterobacteriaceae	SIP	Sharps Injury Protection
CRO	Carbapenems Resistant Organisms	SOP	Standard Operating Procedures
CRPsA	Carbapenem-Resistant <i>Pseudomonas Aeruginosa</i>	SP	Standard Precautions
DCMO	Deputy Chief Medical Officer	SSD	Sterile Services Department
DHMT	District Health Management Team	SSI	Surgical Site Infection
DMO	District Medical Officer	TB	Tuberculosis
DSO	District Surveillance Officer	TBP	Transmission-Based Precautions
ED	Emergency department	TDP	Tetanus, Diphtheria, Pertussis
ET	Endotracheal Tube	TST	Tuberculin Skin Test
EVD	Ebola Virus Disease	UNOPS	United Nations Office for Project Services
FFP	Filtering face piece	UV	Ultraviolet
HAI	Health Care-Associated Infections	VAP	Ventilator Associated Pneumonia
HAP	Hospital Acquired Pneumonia	VHF	Viral Haemorrhagic Fevers

HB	Antibody	VRE	Vancomycin-Resistant Enterococci
HBIG	Hepatitis B Immune Globulin	WASH	Water, Sanitation and Hygiene
HBV	Hepatitis B	WBC	White Blood Cell
HCF	Healthcare Facility	WCO	WHO Country Office
HCP	Health-Care Personnel	WHO	World Health Organization
HCW	Healthcare Worker	XDR	Extensively Drug-Resistant
HIV	Human Immunodeficiency Virus		

## Introduction to the guidelines

### Background

Infection prevention and control (IPC) is at the heart of high-quality health care. An effective IPC programme keeps patients and health care workers safe. Global and national outbreaks, including the SARS-CoV-2 pandemic of 2020 and the 2014 Ebola Virus Disease outbreak in West Africa highlight and reinforce the urgent need to strengthen health systems in Sierra Leone. IPC infrastructures, processes, practices and a supportive culture are fundamental to a strong health system.

The first national IPC guidelines of Sierra Leone were developed in 2015 by the National IPC Unit in the Directorate of Health Securities and Emergencies, MoHS with technical support from the World Health Organisation (WHO) and Centre for Disease Control (CDC). Since 2015 a number of factors have influenced the need to review and update these guidelines including the publication in 2016 by WHO of international guidelines that set out the Core Components of IPC programmes and the development of the Government of Sierra Leone's National Strategic Plan (NAP) for combatting antimicrobial resistance (AMR) (2018-2022). Reducing the incidence of infection through effective sanitation, hygiene and IPC measures forms one of the strategic objectives described in the AMR NAP. In addition, multiple assessments conducted by the MoHS and partner organizations (e.g. WHO, CDC) during 2017-2019 highlighted the need to update the national guidelines to provide reference guidance on IPC best practices in different medical specialties and to include prevention and triaging of infectious diseases of epidemiological importance.

The National IPC Guidelines have been co-developed and updated by the National IPC Coordinator in collaboration with WHO and CDC, with review and approval by the Ministry of Health and Sanitation.

### Rationale for HAI prevention

Health care-associated infections (HAI) are one of the most common adverse events associated with health care and a major public health problem. HAIs are infections that were not present or incubating at the time of admission. They are responsible for significant morbidity and mortality impacting the quality of life of patients and can lead to prolonged hospital stay, increasing the economic burden to individuals and health systems. A large proportion of HAI are preventable through the implementation of proven IPC strategies. IPC is concerned with patient and healthcare worker safety and is a part of a multidisciplinary approach to strengthening the healthcare system and preventing HAI.

Although the disease burden and economic impact of HAIs in developing countries are not well understood available data suggests a disproportionate burden of HAI in Africa compared with many other parts of the world - new-borns are at highest risk, with HAI responsible for 75% of all neonatal deaths. Historically, HAIs in Sierra Leone have not been systematically tracked or studied. However, there is a consensus, informed by the 2014 Ebola outbreak, the SARS Cov-2 pandemic and the growing threat of AMR that HAIs endanger patient and healthcare worker safety and need to be the subject of surveillance, investigation and improvement action. Assessments have taken place throughout 2020 with overall results of partial compliance presented. There is much to be learned from these results, of for example hand hygiene, isolation practices, etc.

A comprehensive IPC system with national evidence-based and regularly updated IPC guidelines and strategies is therefore critical to ensure IPC practices and procedures are implemented and adhered to with the aim of reducing HAIs<sup>1</sup> including future outbreaks, combatting AMR and achieving optimal health outcome.

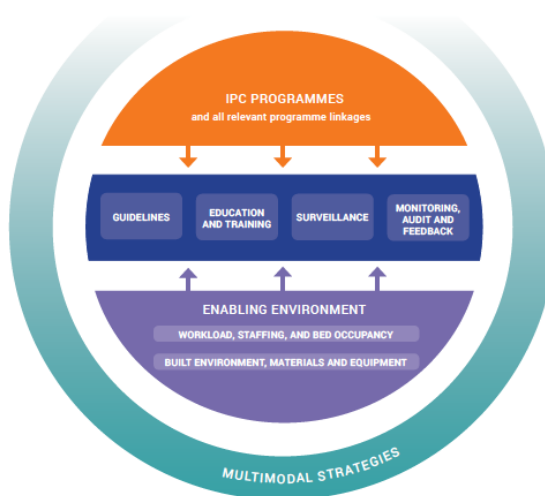
## Preventing HAI through an effective IPC programme: the eight core components

International evidence recommends that effective IPC programmes in health care facilities should be made up of eight interrelated components, termed “core components”. (Figure 1 & 2)

**Figure 1: the Eight Core Components**

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

**Figure 2 visual of the 8 Core Components**



## Aim and purpose of these guidelines

These updated National IPC Guidelines aim to provide comprehensive and standardised recommendations for an effective IPC programme across each level of the health system in Sierra Leone. An effective programme, developed around eight core components will contribute to improved and sustainable IPC practices, infrastructures and culture.

The key purpose of the guidelines is to protect patients and healthcare workers from HAIs and occupational exposure to infectious diseases. They act as a reference document for IPC best practices in Sierra Leone for all healthcare providers as part of an overall policy to ensure effective and safe practices and promote a culture of continuous IPC improvement at all healthcare facilities.

## Target audience

The Guidelines are for use by all those working in or supporting health care, including those at national level, health care workers, managers and support workers.

## Use of these Guidelines

The Guidelines outline the nationally approved, evidence-based recommendations for IPC practices, infrastructures and culture necessary for patient and healthcare worker safety and form an important component of a comprehensive national IPC strategy. The Guidelines are available for use by healthcare workers, patients, other carers and communities, and will be updated regularly. To aid uptake and support implementation, the Guidelines can be used as the basis for local adaptation, taking account of local needs and resources while maintaining key IPC standards.

## Evidence base

The Guidelines are based on available international norms and standards, in particular the WHO Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level (2016).

## Structure of the guidelines

Each chapter addresses:

- **Relevant international and national guidance and tools:** Each chapter starts by signposting the relevant international and national guidelines and potentially relevant tools.
- **Key practice points:** a maximum of 10 key points are listed for the reader to easily see a summary of the chapter.
- **Introduction - why (rationale):** the chapter introduces the issue and why IPC is important.
- **When and how:** where appropriate the chapter addresses the when and how of the relevant chapter topic.
- **Considerations in facilities with limited resources:** where appropriate and based on evidence, recommendations for overcoming WASH challenges are listed.
- **Additional considerations:** a short summary of any additional considerations relevant to the chapter topic.
- **Multimodal improvement strategies:** At the end of each chapter a multimodal improvement strategy table is included. Multimodal strategies are recommended for implementation of IPC interventions according to WHO's Core Component Guidelines. Each chapter prompts the user to consider the five elements of a multimodal strategy to aid translation of the guidelines into practice (see description in table 1). For each guideline recommendation, healthcare facility leaders and managers as well as policy-level actors are prompted to consider the five elements.



**Table 1: Multimodal Improvement Strategy**

<p><b>1. System change – build it</b> (the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</p>	<ul style="list-style-type: none"> <li>• Access to the right equipment and supplies, and an environment that is designed and planned to facilitate the guideline recommendations.</li> </ul>
<p><b>2. Training and education – teach it</b> (to improve health worker knowledge)</p>	<ul style="list-style-type: none"> <li>• A program of routine training, education, and periodic retraining for all personnel involved in the recommendations presented in the guidelines.</li> </ul>
<p><b>3. Monitoring and feedback – check it</b> (to assess the problem, drive appropriate change and document practice improvement)</p>	<ul style="list-style-type: none"> <li>• A program of regular supervision and feedback is in place in relation to the guideline recommendations including a surveillance program.</li> </ul>
<p><b>4. Reminders and communication – sell it</b> (to promote the desired actions, at the right time, including campaigns)</p>	<ul style="list-style-type: none"> <li>• The practices described in the guidelines are reinforced through awareness raising (e.g., use of posters displayed in clinical areas).</li> </ul>
<p><b>5. Culture and change – live it</b> (to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</p>	<ul style="list-style-type: none"> <li>• Managers and leaders at every level of the healthcare facility show their visible support for the National IPC Guideline’s recommendations to help foster, develop and reinforce a culture of patient safety and IPC.</li> <li>• Colleagues from quality improvement, WASH, AMR, Occupational Health and patient safety are involved in the development and promotion of IPC multimodal strategies.</li> <li>• IPC committees meet regularly to discuss assessments and develop action plans based on results.</li> <li>• IPC is integrated into the agenda of in-charges meetings to routinise best practices and a culture of safety</li> </ul>

# Chapter 1: Introduction to IPC; Structure and management of the IPC programme in Sierra Leone

## Central policy issue for safe, high-quality care

IPC is a necessary component of safe, high quality patient care and is essential for the wellbeing of patients and staff. IPC can also only be achieved with functioning water, sanitation and hygiene (WASH) services. Where IPC and WASH is insufficient, community trust in services is likely to be damaged. In order to prevent HAI, combat AMR and strengthen the public's trust in health services, WHO Guidelines on Core Components of infection prevention and control programmes (2016) recommend a national IPC programme with clearly defined objectives, functions and activities should be established. At the health care facility level an IPC programme with a dedicated, trained team should be in place.

Each level of the IPC program, from the person(s) charged with administrative support to the direct care provider at the patient bedside, should share in the overall responsibility of preventing infection. The hierarchy of the infection prevention and control program in Sierra Leone should include all levels of health care e.g., the national, district, and hospital facility levels.

National IPC programmes should be linked with other relevant national programmes and professional organizations. An effective IPC programme is highly relevant to a) other national programmes, for example AMR, IHR, emergencies and preparedness, WASH, occupational health, Tuberculosis, HIV, maternal, child and adolescent health b) civil society bodies and patient organisations should also be considered c) scientific professional organisations (e.g., IPC professional societies and other relevant medical, nursing and health professional societies) d) training establishments and academia.

Strengthening IPC and WASH in the context of national directions on quality has been described as important.

This section summarises IPC as an important policy issue and outlines the structure and function of IPC across all levels of the health system in Sierra Leone.

## IPC as a policy issue

<b>Summary of the problem</b>	<ul style="list-style-type: none"><li>• HAIs are a significant threat to patient and healthcare worker safety in Sierra Leone. Sub-optimal IPC practices increase the risk of HAI, contribute to the spread of AMR and heighten the risk of ongoing and future outbreaks.</li></ul>
<b>Available evidence</b>	<ul style="list-style-type: none"><li>• <b>International:</b> Implementation of the eight core components of IPC programmes (see next section) will strengthen the health system, reduce HAI, AMR and outbreaks and protect patients and health workers.</li><li>• <b>National:</b> Situational analyses, evidence, and lessons gathered from the 2014-2015 Ebola outbreak, several national IPC assessments (2016-19) and the COVID-19 pandemic (2020) highlight vulnerabilities in infrastructure and practice at every level of the healthcare system.</li></ul>
<b>Policy direction</b>	<ul style="list-style-type: none"><li>• The MoHS of Sierra Leone have prioritized a series of actions to address the deficits in IPC across the entire health system with the aim of improving the safety of patients and healthcare workers. These actions centre around the development of national IPC guidelines that are based on available international evidence of what constitute the core components of IPC programmes.</li></ul>

- The National IPC Guidelines have been co-developed and updated by the National IPC Coordinator in collaboration with WHO and CDC, with review and approval by the Ministry of Health and Sanitation.
- The Directorate of Health Securities and Emergencies, through the national IPC Unit is tasked with setting IPC objectives informed by local assessments and priorities (including based on local epidemiology) and overseeing the development of IPC infrastructure and culture in Sierra Leone. This Unit is responsible for the development, updating and dissemination of guidelines and SOPs for IPC practices in the country. This Unit is also responsible for the implementation and management of National IPC guidelines and associated SOPs.
- Additionally, the national IPC unit will monitor and update the National IPC guidelines regularly, no more than every five years to reflect the changes in epidemiology, evidence, risks, best practices and available resources. Emphasis will be placed on maximizing the dissemination and implementation of the Guidelines across all levels of the healthcare system
- The Guidelines will be made readily available for healthcare workers, patients, and communities and will be updated regularly.
- Emphasis will be placed on maximizing the dissemination and implementation of the Guidelines across all levels of the healthcare system

### Organizational structure of the IPC Programme in Sierra Leone

The structure of the IPC programme is in accordance with international guidelines (WHO Core Components) and has been outlined, from the Director of health securities and emergencies down to a PHU IPC focal person.

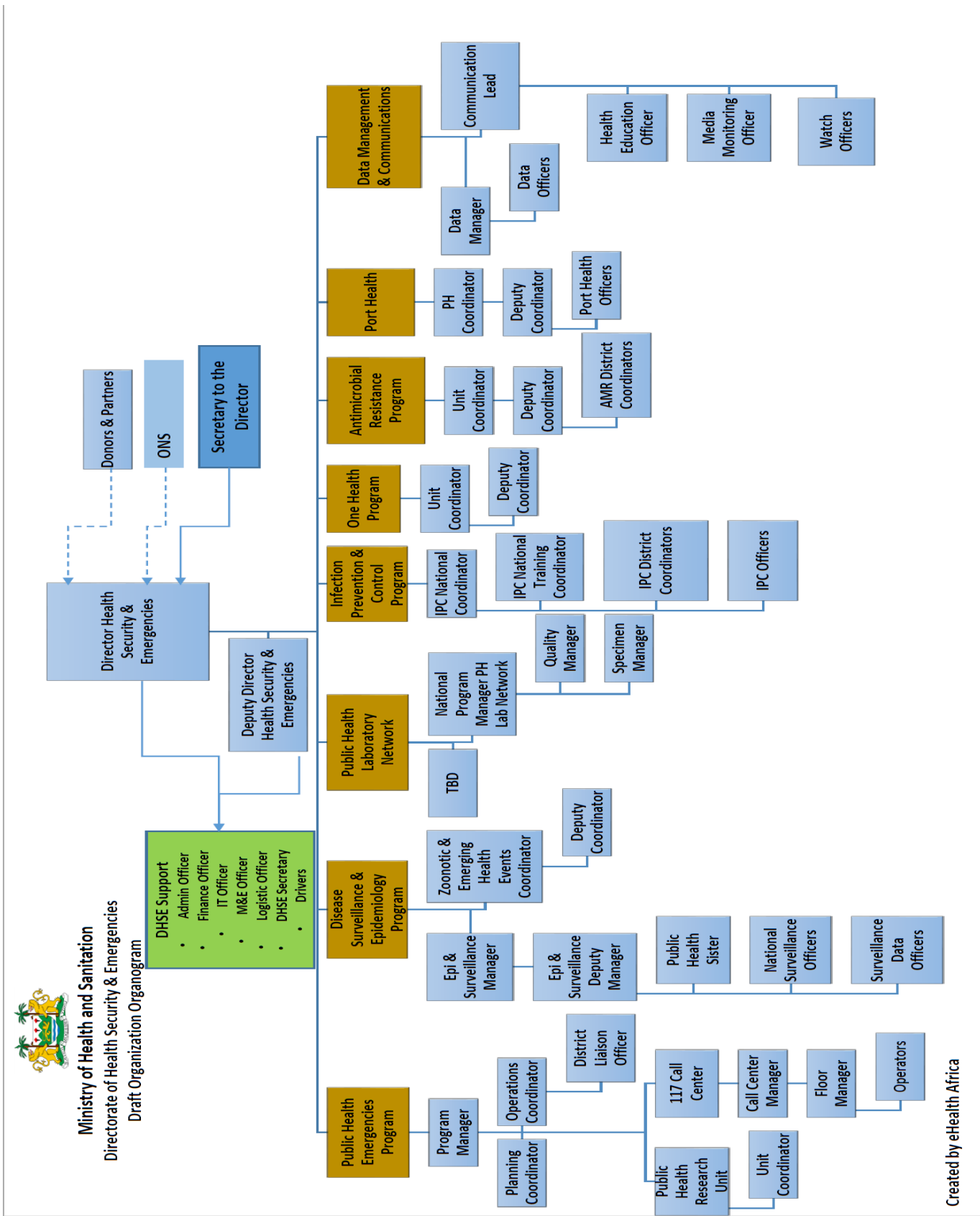


Figure 1: Organizational structure of the IPC Programme in Sierra Leone

## National Level

### Roles and Responsibilities of National Level

#### Ministry of Health and Sanitation

The IPC Policy document lays out the MoHS vision for the establishment of an effective IPC programme in line with WHO Core Components.

**Table 2: Key roles & responsibilities of MoHS**

	MoHS
<b>Key roles &amp; responsibilities</b>	<ul style="list-style-type: none"><li>• The MoHS has the responsibility for ensuring that the healthcare workforce, patients, and the community are protected from HAIs.</li><li>• In recognition of the need for IPC strengthening in all levels of governmental health facilities (e.g., district hospitals, peripheral health units), private, faith-based, and military facilities, the MoHS is committed to:<ul style="list-style-type: none"><li>○ Developing national IPC guidelines, policies, and standard operating procedures (SOPs);</li><li>○ Establishing and supporting MoHS IPC units and IPC focal persons at the national, district, and healthcare facility level including an identified, protected and dedicated budget allocated according to planned activity;</li><li>○ Establishing a system for monitoring, evaluating, and reporting key IPC indicators;</li><li>○ Instituting the governance structure within which these units and personnel will operate, as defined in the National IPC Policy document.</li><li>○ Promoting clear linkages, including routine communication, between IPC and other programmes and professional organization for example AMR, quality and safety, WASH, TB, HIV, immunization, maternal child and adolescent health.</li><li>○ Strengthening surveillance and epidemiology of HAI and HAI-related aspects of AMR in collaboration with epidemiologists, data managers and IT experts</li><li>○ Integrating IPC with IHR and preparedness relating to PHEIC. public health emergencies of international concern</li><li>○ Strengthening linkages between IPC and national referral laboratories, occupational health programmes, patients' association/civil society bodies, scientific professional organizations, training establishments and academia.</li><li>○ Strengthening IPC committees at district and facility levels</li><li>○ Strengthening reporting and updates from DHMTs to the NIPCU</li><li>○ Expanding the IPC mentorship programme.</li></ul></li></ul>

## National IPC Advisory Committee (NIPC-AC)

**Table 3: Roles and responsibilities of National IPC Advisory Committee (NIPC-AC)**

	<b>NIPC-AC</b>
<b>Frequency of meetings</b>	The Advisory Committee will meet no less than quarterly.
<b>Role</b>	The National IPC Advisory Committee will be chaired by the Deputy Chief Medical Officer (DCMO) with the National IPC Coordinator acting as Secretary.
<b>Terms of reference</b>	<p>The Advisory Committee will:</p> <p>Provide input to IPC policy, strategic plans (including for outbreaks), guidelines, SOPs and management issues as needed, for effective, evidence-based practices.</p> <p>Be an advocate for obtaining financial and human resources for IPC, including procurement of adequate supplies for IPC practices.</p> <p>Set national and district goals for preventing HAIs with both endemic and epidemic potential and IPC quality indicators, and will review the progress toward these national goals, objectives and strategies.</p> <p>Provide input into the development of a) training and education programmes for the facility level b) national monitoring frameworks to measure implementation with policies, guidelines and standards c) surveillance and epidemiology of HAI and HAI-related aspects of AMR.</p>
<b>Membership</b>	<p>The Advisory Committee will consist of key stakeholders in the MoHS including:</p> <p>Deputy Chief Medical Officer (CMO 2).            Chief Nursing and Midwifery Officer (CNMO).            Director of Health Security and Emergencies.            Registrar of the Pharmacy Board of Sierra Leone.            Director National AIDS Secretariat.            TB Program Manager.            Quality of Care Program Manager.            Director of Hospital and Ambulance Services.            Director of Laboratory, Diagnostic and Blood Services.            Director of Environmental and Waste Management.            Director of Primary Healthcare.            Representatives of the World Health Organization (WHO), UNICEF, the US Centres for Disease Control and Prevention (US_CDC), China CDC and all the other major international NGO's.            Other parties as required e.g., Health training institutions such as Medical, Nursing and Midwifery schools.            The Deputy Chief medical officer (Public Health) will serve as Chairman of the National IPC Advisory Committee.</p>

### National IPC Unit

- The National IPC Unit will consist of support staff that under the supervision of the National IPC Coordinator, executes the tasks for which the National IPC Coordinator has ultimate responsibility.

### National IPC Coordinator

At least one (1) full time person for IPC will be in place at the national level.

**Table 4: Role of National IPC Coordinator**

	<b>National IPC Coordinator</b>
Role	<ul style="list-style-type: none"> <li>• The National IPC Coordinator oversees the National IPC Unit (see below) and is responsible for overall coordination and leadership of the National IPC Programme activities, including the development, implementation and evaluation of the IPC Programme.</li> </ul>
Lines of reporting & accountability	<ul style="list-style-type: none"> <li>• The National IPC Coordinator in collaboration with Director of Health Security and Emergencies, Director of Hospital and Ambulance Services, Director Primary healthcare, Director of Laboratory and Blood Services and the Chief Nursing and Midwifery Officer (CNMO) will report progress and issues to the Deputy Chief Medical Officer 2 (Public Health) every month at standing meetings.</li> </ul>
Terms of reference	<ul style="list-style-type: none"> <li>• The National IPC Coordinator activities include and are not limited to:</li> <li>• Oversight of the development, updating, and distribution of IPC guidelines, IPC pocket books, SOPs, strategic documents, training curricula, monitoring and evaluation tools, systems and performance standards to healthcare workers nationwide;</li> <li>• Oversee the National IPC Unit of the MoHS</li> <li>• Liaise with other MoHS directorates and partners to ensure that IPC activities are coordinated across the country for example those departments responsible for national quality, safety and WASH.</li> <li>• Evaluate progress and provides feedback to district and facility IPC Focal Persons on implementation of IPC activities at national, district, and facility level; this activity includes assessment visits to district offices, at least twice yearly and visits to individual healthcare facilities, as needed;</li> <li>• Advise Central Medical Stores (CMS) on the quality, quantity, and availability of IPC supplies in public healthcare facilities. Additionally, is responsible for requesting any other items or equipment needed for IPC;</li> <li>• Ensure district and facility IPC Focal Persons and all cadres of healthcare staff are adequately trained on IPC and that knowledge and practice gaps are addressed with further training as needed;</li> <li>• Review reports and action plans submitted by District IPC Focal Persons. These reports and plans include incidence of HAIs, healthcare worker injuries and other indicators, as required;</li> <li>• Generate national IPC progress reports and present findings to the National IPC Advisory Committee at least twice yearly;</li> <li>• Coordinate and attends meetings of the National IPC Advisory Committee;</li> <li>• Develop an annual National IPC Programme action plan to meet the above activities, and develops other action plans, as needed, to address IPC challenges that require immediate action at the National level.</li> </ul>

## Members

- Infection Prevention and Control Officers (5)
- Medical epidemiologist (1)
- Training coordinator.
- Monitoring and evaluation (M&E) officer (1)
- Administrative officer
- Pharmacist/ Logistician
- IT (1)

## District Level

Roles and Responsibilities of the District Level are summarised below.

### District IPC Committee

**Table 5: Role of District IPC Committee**

	District IPC Committee
<b>Frequency of meetings</b>	<ul style="list-style-type: none"> <li>• Monthly</li> </ul>
<b>Role</b>	<ul style="list-style-type: none"> <li>• The District IPC Committee will review the progress towards full implementation of the National IPC Programme in all facilities in their district.</li> </ul>
<b>Terms of reference</b>	<ul style="list-style-type: none"> <li>• Meet monthly to review IPC progress at district facilities towards district IPC quality goals, including the pace of improvements for IPC components, any HCW exposure incident reports, and the actions taken as a result of the incident</li> <li>• Chaired by the DMO, District IPC focal as vice chair and district supervisor as secretary</li> <li>• Ensure that adequate and appropriate resources are available to support IPC practices within district facilities, interfacing as necessary with relevant authorities and partners in supply distribution or other areas to address any resource shortfalls;</li> <li>• In the case of any challenges with facility-level implementation of national IPC standards brought to the Committee's attention by the District Supervisor or District IPC Focal Person, provide final decisions on resolution mechanisms; or escalate through the District IPC Focal Person or IPC Supervisor to the National IPC Coordinator for guidance from the CMO or CNO</li> <li>• Provide input to support the District Medical Officer in calculation of the IPC component of the district medical budget.</li> </ul>
<b>Membership</b>	<ul style="list-style-type: none"> <li>• Key stakeholders in the district including:</li> <li>• District Medical Officer (DMO).</li> <li>• District Surveillance Officer (DSO).</li> <li>• District IPC Focal Person.</li> <li>• District Pharmacist.</li> <li>• Hospital IPC Focal person.</li> <li>• IPC Supervisor.</li> <li>• Medical Superintendents.</li> <li>• District Environmental Health Superintendent.</li> <li>• Representatives of NGOs active in IPC support in the district.</li> <li>• Local and city council representatives.</li> <li>• District operations officers.</li> <li>• Monitoring and Evaluation Officer.</li> </ul>



## District IPC Focal Person

**Table 6: Roles and responsibilities of District IPC Focal Person**

	District IPC Focal Person
<b>Role</b>	<ul style="list-style-type: none"> <li>The District IPC Focal Person serves as deputy Chair of the District IPC Committee and is responsible for overall coordination and leadership of the District IPC Programme activities, including the development, implementation, and evaluation of the District IPC Programme.</li> </ul>
<b>Lines of reporting &amp; accountability</b>	<ul style="list-style-type: none"> <li>The District IPC Focal Person will report progress and issues to the District Medical Officer (DMO) through the District Health Sister 1 (DHS 1) at standing meetings every month with emerging issues.</li> <li>The National IPC Coordinator, as needed.</li> </ul>
<b>Terms of reference</b>	<ul style="list-style-type: none"> <li>Oversee the district implementation of National IPC policy, strategy, procedures, SOPs, and IPC training curricula;</li> <li>Coordinate with other district partners to ensure that IPC activities are coordinated across groups;</li> <li>Ensure the distribution of supplies and reports on the available stock level of IPC supplies in district health units.</li> <li>Evaluate progress of IPC implementation activities at district and facility level; this activity includes assessment visits to individual facilities twice-yearly and as needed;</li> <li>Ensure facility IPC Focal Persons and facility healthcare staff are adequately trained in IPC and ensure knowledge and practice gaps are addressed with further training and provision of necessary supplies and tools;</li> <li>Review reports and action plans submitted by facility IPC Focal Persons. These reports and plans include incidence of HAIs, healthcare worker injuries, and other indicators, as required, e.g., availability of water, frequency of cleaning, availability of soap and PPE in health facilities in the districts</li> <li>Generate district IPC progress reports and present findings to the District IPC Committee monthly;</li> <li>Distribute IPC documents and update provided by the National IPC Coordinator and other stakeholders to all facilities;</li> <li>Meet quarterly with district IPC Supervisor and/or facility IPC Focal Persons to discuss facility-level IPC progress and challenges;</li> <li>Obtain and consolidate input from Hospital IPC Committee members to support the Medical Superintendent in development of the IPC component of the Hospital budget;</li> <li>Coordinate obtaining input from District IPC Committee members and PHU IPC focal persons to support the DMO in development of the IPC component of the district medical budget;</li> <li>Provide direct supervision to the PHU IPC Focal Persons through quarterly meetings;</li> <li>Submit monthly district report to the National IPC Coordinator; and</li> <li>Develop a yearly District IPC Programme action plan to meet the above activities and the goals set by National and district committees.</li> </ul>

## District IPC Supervisor

**Table 7: Roles and responsibilities of District IPC Supervisor**

	IPC Supervisor
<b>Role</b>	<ul style="list-style-type: none"> <li>The IPC Supervisor will mentor and support the IPC focal persons at the facilities in their district to improve IPC practices, program, systems and training. There will be at least one IPC Supervisor per district.</li> </ul>
<b>Lines of reporting &amp; accountability</b>	<ul style="list-style-type: none"> <li>District Medical Officer through the District Health Sisters (DHS) 1 &amp; 2</li> <li>National IPC Unit as necessary</li> </ul>
<b>Terms of reference</b>	<ul style="list-style-type: none"> <li>Ensure Implementation of the National IPC Policy and Guidelines at the hospitals and PHUs</li> <li>Provide DHMTs and PHU staff with evidence-based information on all aspects of IPC procedures and practices</li> <li>Provide supportive supervision, mentorship, and guidance to facility IPC Focal Person and help develop Action Plans to address IPC challenges in facilities, including addressing incidents reported by IPC focal.</li> <li>Provide support in conducting IPC trainings for healthcare workers (including developing training plans and monitoring the implementation of IPC measures)</li> <li>Fill in for facility IPC Focal Person in key time-sensitive IPC responsibilities when facility IPC Focal Person is not available</li> <li>Adapt Standard Operation Procedures for Hospitals and PHUs (Environmental, cleaning, Hand hygiene, decontamination, waste management, etc)</li> <li>Initiate immediate corrective actions through on job training and mentorship when lapses in IPC are noticed</li> <li>Collaborate with other DHMT members to ensure the recommended IPC practices and trainings are implemented and conducted at the district level</li> <li>Support on-going training programmes to ensure that all hospital and PHU staff are knowledgeable and are implementing the recommended IPC practices</li> <li>Ensure the necessary and recommended IPC equipment and supplies are identified and distributed across healthcare facilities within the district.</li> <li>Monitor and document daily, IPC activities and incidents within the hospital, including hospital acquired infections, healthcare worker injuries, and other risk exposure or infections of public health concern.</li> <li>Conduct routine IPC audits, monitoring and supportive supervision using the standardized and nationally accepted tools for Hospitals and PHUs</li> <li>Generate and present reports for the monthly District IPC Committee meeting.</li> <li>These reports should include findings from routing IPC monitoring/audits and supportive supervision like IPC compliance in PHUs and Hospitals, healthcare worker infection, IPC supplies, and other indicators as required.</li> <li>Coordinate with other partners within the district and District Committee to support the development and allocation of budgets for IPC activities</li> <li>Develop a quarterly and yearly District IPC Programme risk assessment and action plan which includes performance measures to meet the above activities</li> <li>Report activities and issues to the monthly District IPC Committee meetings on indicators as required by the National IPC Programme.</li> </ul>

## Hospital Level

WHO Core Component Guidelines recommend that an IPC programme with a dedicated, trained team is in place in each acute health care facility for the purpose of preventing HAI and combating AMR through IPC good practices.

In Sierra Leone each hospital has in place a multidisciplinary IPC Committee with demonstrable leadership and support from the medical superintendent and matron, an IPC focal person and ward-based IPC link nurses.

**Table 8: Roles and responsibilities of Hospital IPC Committee**

	Hospital IPC committee
<b>Frequency of meetings</b>	<ul style="list-style-type: none"> <li>Monthly, and as needed</li> </ul>
<b>Role</b>	<ul style="list-style-type: none"> <li>To ensure coordination among all key members of hospital staff to implement IPC practices according to the National IPC Programme.</li> </ul>
<b>Duties &amp; responsibilities</b>	<ul style="list-style-type: none"> <li>Review hospital assessment results and trends on hospital acquired infections, healthcare worker injuries and other indicators provided by the Hospital IPC focal person from the last meeting;</li> <li>Review any new National guidance and/or materials provided through the National IPC Coordinator;</li> <li>Address IPC issues which require cooperation and coordination across multiple stakeholders. Develop action plans, including timelines, with responsible stakeholders;</li> <li>As coordinated by the Hospital IPC Focal Person, provide input to support the Medical Superintendent in development of the IPC component of the hospital budget.</li> </ul>
<b>Membership</b>	<ul style="list-style-type: none"> <li>Medical Superintendent</li> <li>Hospital Matron</li> <li>Hospital Secretary</li> <li>Heads of Clinical Departments</li> <li>Hospital IPC Focal Person</li> <li>Laboratory lead</li> <li>District IPC Supervisor</li> <li>Supply Store Clerk</li> <li>Pharmacist</li> <li>Environmental Services Manager/ those tasked with addressing water, sanitation, hygiene and waste management (WASH).</li> <li>Others as deemed necessary by the Committee to provide guidance/clarification on identified issues related to IPC.</li> </ul>

## Key duties, Roles and Responsibilities of Hospital IPC committee members

**Table 9: Roles and responsibilities of Hospital IPC Committee Members**

IPC committee member	Roles and responsibilities
Medical Superintendent	<ul style="list-style-type: none"> <li>• The medical superintendent chairs the Hospital IPC committee</li> <li>• To support the Hospital IPC Focal Person through the matron to make the necessary infrastructure and policy implementation in the facility.</li> <li>• In collaboration with the laboratory for Infection surveillance:</li> <li>• Meet regularly with the Hospital IPC focal person (at least once per month) to discuss status of IPC at the facility including any HAI and reported incidents;</li> <li>• Work with Hospital IPC Focal Person to prioritize and implement any changes in the facility including instructing staff and arranging procurement of IPC supplies;</li> <li>• Meet regularly (once monthly) with the District IPC Supervisor and the Hospital IPC Focal Person to evaluate progress toward goals and quality improvement, this could also be done through the monthly Hospital IPC Committee meetings;</li> <li>• Responsible to ensure facility policy related to IPC implementation;</li> <li>• Ensure coordination between Hospital IPC Focal Person and other key staff (e.g., store keeper), where this lies outside the Matron's purview;</li> <li>• With input from the Hospital IPC Committee members and Hospital IPC Focal Persons develop the IPC component of the Hospital budget.</li> </ul>
Hospital Matron	<ul style="list-style-type: none"> <li>• Reports to Medical Superintendent on behalf of hospital IPC focal person through monthly Hospital IPC Committee meetings.</li> <li>• Responsible, within their purview, for giving the necessary facility-level direction on staff practices and equipment and supplies management to address IPC issues brought to their attention by the Hospital IPC Focal Person.</li> </ul>
Hospital Pharmacist	<ul style="list-style-type: none"> <li>• Provide medical staff with list of available antibiotics as developed and agreed upon by the Drug and Therapeutics Committees, indicating dosage, routes and toxicities.</li> <li>• Obtain, store and distribute pharmaceutical preparations using practice that limit potential transmission of infectious agents to patients.</li> <li>• Dispense antimicrobial drugs and maintain relevant records (potency, incompatibility, conditions of storage and deterioration).</li> <li>• Maintain records of antibiotics distributed to medical departments.</li> <li>• Provide the drugs and therapeutics committee and the infection prevention and control committee with summary reports and trends of antimicrobial use.</li> <li>• Provide feedback to prescribers on the impact their prescribing decision have on the budget.</li> <li>• Participate in hospitals sterilization and disinfection practices by being involved in the development of guideline for disinfectants, hand hygiene solutions and antiseptics.</li> </ul>
Heads of Departments	<ul style="list-style-type: none"> <li>• Reporting IPC issues to the Hospital IPC Focal Person and;</li> <li>• Implementing hospital IPC policy and procedures in their department.</li> </ul>

	<b>Hospital IPC focal person</b>
<b>Role</b>	<ul style="list-style-type: none"> <li>• A full time IPC Focal is to serve as secretary of the Hospital IPC Committee</li> <li>• At least one full-time IPC professional or equivalent (nurse or doctor working 100% in IPC), with dedicated time in place per 250 beds</li> <li>• Responsible for implementing the National IPC Policy and Guidelines at the facility level.</li> <li>• The Hospital IPC Focal Person will report progress and issues to the Matron and Medical Superintendent at their standing meetings.</li> </ul>
<b>Lines of reporting &amp; accountability</b>	<ul style="list-style-type: none"> <li>• Hospital Matron &amp; Medical Superintendent</li> <li>• National IPC Unit as necessary</li> </ul>
<b>Terms of reference</b>	<p>The Hospital IPC Focal Person activities include:</p> <ul style="list-style-type: none"> <li>• Ensure Implementation of the National IPC Policy and Guidelines at the hospital facility</li> <li>• Advise staff with evidence-based information on all aspects of IPC to maintain a clean and safe environment for patients, visitors and staff</li> <li>• Adapt Standard Operation Procedures for basic IPC precautions (Environmental, cleaning, Hand hygiene, decontamination, waste management etc)</li> <li>• Monitor staff adherence to IPC practices and ensures compliance with National IPC Guideline and SOPs</li> <li>• Initiate immediate corrective actions through on job training and mentorship when lapses in IPC are noticed</li> <li>• Collaborate with District IPC Focal Person, Supervisor to ensure the recommended IPC practices and trainings are implemented and conducted within the hospital</li> <li>• Plan and conduct on-going training programmes to ensure that all hospital staff are knowledgeable and are implementing the recommended IPC practices</li> <li>• Ensure the necessary and recommended IPC equipment and supplies are identified, forecasted, available and used appropriately</li> <li>• Monitor and document daily, IPC activities and incidents within the hospital, including hospital acquired infections, healthcare worker injuries and other risk exposure or infections of public health concern</li> <li>• Conduct IPC routine (Weekly/monthly) assessments and audits using the standardize and nationally accepted tools.</li> <li>• Conduct daily ward audit, give feedback and develop training needs</li> <li>• Generate and present reports for the monthly Hospital IPC Committee meeting. These reports should include findings from routing IPC monitoring/audits like IPC compliance, findings from healthcare associated infections, healthcare worker injuries or exposures, IPC supplies and other indicators as required.</li> <li>• Coordinate and obtain input from the Hospital IPC Committee members to support the Medical Superintendent in development of the IPC component of the hospital budget</li> <li>• Develop a yearly Hospital IPC Programme risk assessment and action plan which includes performance measures to meet the above activities</li> <li>• Report activities and issues to the monthly District IPC Committee meetings on indicators as required by the National IPC Programme.</li> </ul>
<b>IPC Link</b>	<p>Each Department should have link representative responsible for:</p> <ul style="list-style-type: none"> <li>• Reporting IPC issues to the Hospital IPC Focal Person</li> <li>• Implementing hospital IPC policy and procedures in their department</li> <li>• Implementing HAIs surveillance activities, collect data and report on daily basis to the hospital IPC focal person.</li> </ul>

### Peripheral Health Unit (PHU) Level

Each PHU has an IPC focal person, trained in IPC and with dedicated (part-time) allocated to IPC.

## Roles and Responsibilities of the PHU IPC focal person

Table 10: Roles and responsibilities of PHU IPC Focal Person

	PHU IPC Focal Person
<b>Role</b>	<ul style="list-style-type: none"> <li>The PHU IPC Focal Person is responsible for implementing the national IPC policy and procedures at PHUs.</li> </ul>
<b>Lines of reporting &amp; accountability</b>	<ul style="list-style-type: none"> <li>There is one IPC-trained health care officer at the next administrative level (for example, district) to supervise the PHU IPC Focal Person</li> <li>The PHU IPC Focal person will report progress and issues to the District Medical Officer (DMO) through the District IPC Focal Person and District IPC supervisor at standing meetings every month.</li> </ul>
<b>Terms of reference</b>	<ul style="list-style-type: none"> <li>Meet quarterly with the District IPC focal person for supervision;</li> <li>Advise PHU staff on all aspects of IPC to maintain a safe and hygienic environment for patients, visitors, and staff;</li> <li>Monitor staff adherence to IPC practices (e.g., hand hygiene, sharps safety, disinfection, sterilization) and ensure compliance with National IPC Guideline and SOPs;</li> <li>Initiate immediate corrective actions when lapses in IPC are noticed;</li> <li>Collaborate district Supervisor to ensure the recommended IPC practices are implemented and conducted within the PHU;</li> <li>Conduct on-going training programmes to ensure that PHU staff are knowledgeable and are implementing recommended IPC practices;</li> <li>Ensure the necessary and recommended IPC equipment and supplies are identified, available, and used appropriately;</li> <li>Monitor and document on a daily basis IPC incident within the PHU, including PHU associated infections, healthcare worker injuries, and other indicators as required by the National IPC Programme;</li> <li>Conduct IPC assessments as per National IPC Programme requirements;</li> <li>Generate and present reports for the monthly District IPC Committee meeting. These reports include incidence of PHU acquired infections, healthcare worker injuries and other indicators as required;</li> <li>Coordinate obtaining the necessary information for the District IPC Focal Person to support the District Medical Officer in development of the IPC component of the district medical budget;</li> <li>Develop a yearly PHU IPC Programme risk assessment and action plan which includes performance measures to meet the above activities;</li> <li>Participate in district IPC activities as required;</li> <li>Reconcile reports of consumptions of soaps, PPE, and supplies from PHUs with reports of stocks received from districts level medical stores.</li> </ul>

## Occupational Health

The WHO–ILO Global Framework for National Occupational Health Programmes for Health Workers states that The Ministry of Health will need to consult and work together with other relevant Ministries on the development of the National Occupational Health Programme for Health Workers such as the Ministry of Labour, Social Security, and/or other organization(s) responsible for the protection and promotion of health worker health and safety in the private as well as public sector to:

- Identify a responsible person with authority for occupational health at both the national and workplace levels.
- Develop a written policy on safety, health and working conditions for health workforce protection at the national and workplace levels.
- Ensure access to Occupational Health Services (OHS) by strengthening existing or establishing new occupational health programmes and allocate sufficient resources/budget to the

programme, occupational health professional services, and the procurement of the necessary personal protective equipment and supplies.

- Create joint labour–management health and safety committees, with appropriate worker and management representation.
- Provide ongoing (or periodic) education and training that is appropriate to all parties, including occupational health practitioners, senior executives, front-line managers, health and safety committees, front-line workers and their representatives, and the general public.
- Identify hazards and hazardous working conditions in order to prevent and control them and manage risks by applying the occupational health hierarchy of controls, which prioritizes elimination or control at the source.
- Provide pre-service and ongoing vaccination against hepatitis B and other vaccine preventable diseases in the workplace at no cost to the employee and ensure all three doses of the hepatitis B vaccine have been received by all workers at risk of blood exposure (including cleaners and waste handlers).
- Promote exposure and incident reporting, eliminating barriers to reporting and providing a blame-free environment.
- Promote and ensure health worker access to diagnosis, treatment, care and support for HIV, TB and hepatitis B and C viruses.
- Utilize appropriate information systems to assist in the collection, tracking, analysing, reporting and acting upon data to promote health and safety of the health-care workplace and health workforce
- Ensure that health workers are provided with entitlement for compensation for work-related disability in accordance with national laws.
- Promote research on OHS issues of concern to health workers and translation of research into practice, particularly with respect to combined exposures and applied intervention effectiveness research.
- Promote and implement Greening Health Sector initiatives that incorporate occupational health, green and safe jobs while reducing greenhouse gas emissions with a preference for: use of renewable energy; providing safe drinking water; promoting hand hygiene; active transport; environmentally preferable management of hazardous health care waste; and environmentally preferable selection and disposal of chemicals such as pesticides, disinfectants, and sterilants.

## Chapter 2: Healthcare associated Infections (HAIs) Surveillance Programme - Surveillance of HAIs and Antimicrobial Resistance (AMR) in hospitals

### Relevant international and national guidance and tools

- Report on the Burden of Endemic Health Care-Associated Infection Worldwide [https://apps.who.int/iris/bitstream/handle/10665/80135/9789241501507\\_eng.pdf?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/80135/9789241501507_eng.pdf?sequence=1)
- WHO Global guidelines for the prevention of surgical site infection <https://apps.who.int/iris/bitstream/handle/10665/250680/9789241549882-eng.pdf?sequence=8>
- WHO surgical site infection surveillance protocol <https://www.who.int/infection-prevention/tools/surgical/SSI-surveillance-protocol.pdf>
- WHO Guidelines for the prevention and control of carbapenem-resistant Enterobacteriaceae, *Acinetobacter baumannii* and *Pseudomonas aeruginosa* in health care facilities <https://apps.who.int/iris/bitstream/handle/10665/259462/9789241550178-eng.pdf?sequence=1>
- CDC/NHSN Surveillance Definitions for Specific Types of Infections [https://www.cdc.gov/nhsn/pdfs/pscmanual/17pscnosinfdef\\_current.pdf](https://www.cdc.gov/nhsn/pdfs/pscmanual/17pscnosinfdef_current.pdf)

### Key practice points

- Facilitate national HAI surveillance programmes and support networks, and include a mechanism for timely data feedback with the potential to be used for benchmarking purposes to reduce HAI and AMR.
- Perform facility-based HAI surveillance to guide IPC interventions and detect outbreaks, including AMR surveillance, with timely feedback of results to health care workers and stakeholders and through national networks.
- Health care facility surveillance should be based on national recommendations and standard international definitions and customized to the facility according to available resources with clear objectives and strategies.
- Ensure the responsibility for planning and conducting surveillance, analysing, interpreting and disseminating the collected data remains with the IPC committee and the IPC team, engaging other committees as relevant.
- Use of active methods for detecting infections. Different surveillance strategies could include the use of prevalence or incidence studies.
- Link hospital-based infection surveillance systems to integrated public health infection surveillance systems.
- Disseminate surveillance reports in a timely manner to those at the managerial or administration level (decision-makers) and the unit/ward level (frontline health care workers).
- Conduct high-quality surveillance to detect the magnitude of the problem and to assess the impact of any prevention/improvement intervention and promote a system for surveillance data quality assessment of the utmost importance.
- Focus on a combination of infrastructure and resources, the use of prompts, training, and education (consistent with protocols), surveillance evaluation (using a valid and reliable approach) and a safety culture, to make it more likely surveillance data will be valid and then acted upon to prevent avoidable infections.

### Introduction - why do we perform HAI surveillance?

- On average, 1 in every 10 patients is affected by HAIs. Antibiotic resistant HAIs can double or more, the likelihood of death. As HAI continues to represent the most frequent adverse event during care delivery no institution or country can claim to have solved the problem yet.
- It is clear, globally, that urgent action is needed to prevent and control the spread of antibiotic resistant organisms.
- HAI can affect patients in any type of setting where they receive care and can also appear after discharge.



- Every day, HAI results in prolonged hospital stays, long-term disability, massive additional costs for health systems, high costs for patients and their family, and unnecessary deaths.
- The true global burden of HAI remains unknown because of the difficulty in gathering reliable data. HAI surveillance can be complex and there is often a lack of uniformity of criteria for diagnosing it.
- Surveillance is the ongoing, systematic collection, analysis, and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know.
- Surveillance provides information for:
  - describing the status of infections associated with health care (that is, incidence and/or prevalence, type, aetiology and, ideally, data on severity and the attributable burden of disease) including baselines information on occurrence for decision making, policy and research.
  - microbiological profiling of pathogens causing HAI including the identification of the most relevant AMR patterns;
  - identification of high-risk populations, procedures and exposures;
  - existence and functioning of WASH infrastructures, such as a water supply, toilets and health care waste disposal;
  - benchmarking of infections transmitted in health care settings
  - changes in endemicity of an HAI over time and evaluation of the impact of HAI prevention interventions;
  - early detection of clusters and outbreaks (that is, early warning system).
- In Sierra Leone, the national IPC program started in response to EVD Outbreak and has included surveillance where resources have allowed. Surgical site infection surveillance data is available from 2019-2020 (figure 1).

Surgical Site Infection Surveillance Data in 7 Hospitals in Sierra Leone																											
2019													2020														
	July			August			Septemb			October			November			December			January			February			Mar		
	SSI	#CS	Rate	SSI	#CS	Rate	SSI	#CS	Rate	SSI	#CS	Rate	SSI	#CS	Rate	SSI	#CS	Rate	SSI	#CS	Rate	SSI	#CS	Rate	SSI	#CS	Rate
PCMH	7	188	3.72	9	233	3.86	12	222	5.41	13	252	5.16	10	256	3.91	13	301	4.32	14	266	5.26	4	186	2.15	5	226	2.21
PORTLOKO	11	34	32.35	1	15	6.67	3	13	23.1	3	15	20	4	33	12.1	2	17	11.76	1	11	9.09	NR					NR
CONNAUGHT				0	15	0.00	0	5	0													NR					NR
34 MILITARY	4	19	21.05	0	17	0.00	0	12	0	0	14	0										NR					NR
BO															4	97	4.12	1	59	1.69	0	50	0				NR
MAKENI															0	90	0.00	NR	NR	NR	NR						NR
KONO															3	102	2.94	0	72	0.00	NR						NR

Figure 2: SSI Surveillance Data in seven (7) hospitals in Sierra Leone

The overall burden of surgical site infections during this eight-month period from July to February is 6.86%. There are inconsistencies in reporting as evidenced by the table and there was not enough data to draw conclusions, though a discussion of the challenges and recommendations for the way forward has been presented.

### When to perform HAI surveillance?

- Incidence (routine) surveillance focused on those HAI of most common concern, suspected at local level, or identified as priorities at regional or global level should take place as part of a health care facility IPC programme. The four common types of HAIs in health care facilities are considered to be central line blood stream infections (CLABSI), catheter associated urinary tract infections (CAUTI), surgical site infections (SSI) and hospital (ventilator) acquired pneumonia (HAP). A careful and well-planned surveillance approach applying key elements can ensure usable surveillance data and an effective use of resources.

- Additionally, specific monitoring of alert, including AMR, organisms should be conducted routinely and/or when their prevalence is suspected. Sepsis cases should also be identified.
- On admission, screening of patients with a history of recent hospitalization, including in endemic *carbapenemase resistant enterococci* (CRE) settings, should take place.
- A national surveillance programme and network should also inform local incidence activities.
- Local, national or regional point prevalence surveys may also be undertaken. These tend to be periodic, i.e., yearly or every four years depending on the need and available resources.
- Additionally, outbreak investigation should stem from surveillance findings.
- Finally, it is important that surveillance is conducted once it is fully established that it is within the context of the agreed IPC programme and the availability of resources, e.g., SSI activities that should be undertaken periodically.

### How to perform HAI surveillance?

- **Perform active patient- and laboratory-based prospective incidence monitoring** (routine collection of information on infection presentation), which will actively search for infections, find, diagnose and document, including sentinel pathogens, including multidrug- resistant organisms and categorization of the infection as e.g., SSI, CAUTI, CLABSI, HAP, other. Prospective is more advantageous than retrospective.
- **Use standardized monitoring** following the same definitions and surveillance methods according to adapted international guidelines should be the norm.
- **Make available surveillance protocols**, containing the methods and definitions, and ensure they are accompanied by practical data collection forms, training materials and information sheets to aid application.
- **Outline roles and responsibilities, train data collectors and manage time and commitment expectations** (during an SSI pilot surveillance programme, for example, a number of people have been trained across different facilities, a dedicated surveillance coordinator identified and key collaborations noted in order to achieve success).
- **Use an electronic database**, considered the gold standard, in the collation and reporting of surveillance data to ensure real-time feedback and action. Surveillance programme evaluation should also be built in in a timely manner.
- Provide **regular reports** of comparative data on the levels of HAIs and AMR made available to clinicians to enable them make better empirical treatment choices, to assess implications of their treatment choices and IPC practices, e.g., large handwritten wall charts. This included daily reports from the microbiology laboratory. Notification of infections to and from the relevant hospital committees district, and national levels should also take place.
- Make available a clear outline of **data ownership and usage**
- **Include AMR** (including infections with carbapenems resistant organisms (CROs)) into the notifiable diseases list or the Integrated Disease Surveillance & Response.
- **Consider the risk of data collection fatigue at the outset.**
  
- **Minimum requirements for ensuring the quality of surveillance are:**
  - A written plan that states the goals, objectives and elements of the surveillance process.
  - Adequate, dedicated human resources (professionals trained to undertake HAI surveillance, and ideally, in epidemiology as part of the IPC team and who have protected time) – set up a surveillance team.
  - Informatics including competencies for data management and analysis.
  - Methods for data validation to ensure that data reporting is accurate and reliable.
  
- **Additionally, for successful surveillance:**
  - Engage influential and motivated individuals (e.g., surgeon, anaesthetist, nursing champions, data collector and manager) and a wide range of stakeholders.
  - Instil a sense of local ownership of the data that can be discussed among staff.
  - Ensure concrete leadership support.

- Engage individuals that adopt the role of linking up 'networks' (usually internal networks to external sources).
- Support peer-to-peer and inter-institution learning.
- Provide supervision from the national IPC team to ensure ongoing good quality surveillance data.
- **Key points for surveillance data collection and analysis – measuring surveillance outcomes:**
  - **Numerator (N):** # of patients who develop infection using certain criterion from denominator
  - **E.g., number of surgical site infections**
  - **Denominator (D):** # of patients in follow-up period
  - **E.g., total admissions or number of patients who had surgery and completed follow-up**
  - Normally used together to calculate a risk
  - When measured at one time, this is prevalence
  - When measured over a time period, this is considered incidence.
  - **Numerator = the “event” being measured**
  - *Examples:*
    - Number of HAIs identified through active surveillance: CLABSI, CAUTI, VAP, SSI (peri- and post-operative).
    - Number of HAIs identified by laboratory results alone: CDI, MRSA, VRE BSI
    - Care practices, processes or structure indicators:
      - # of procedures where hand hygiene was conducted
      - # of single-bed rooms available for isolation
  - **Sources of numerator data:**
    - Admission and discharge records
    - Microbiology laboratory and radiology/imaging records
    - Nursing and physician's notes and consults
    - History and physical examination findings
    - Records of diagnostic and surgical interventions, e.g., logs from operating theatres
    - Pharmacy records such as information on administration of antibiotics
    - Visits to wards for observation/discussion with assigned clinicians, e.g., daily rounds inside surgical wards to detect SSI
  - **Numerator data to collect:**
    - Demographic – name, date of birth, gender, hospital identification number, admission date
    - Case definition, infection-specific signs and symptoms – onset date, site of infection, patient care location of HAI onset
    - Risk factors – devices, procedures, other factors associated with HAI
    - Laboratory – pathogens, serology, pathology, dates performed, organisms isolated, antibiotic susceptibility
    - Radiology/imaging – X-ray, CT scan, MRI, etc.
    - Example process indicators – e.g., number of hand hygiene opportunities, number of tests per infection, number of alcohol hand rub at point of care, use of **devices**, date of insertion, device type and site inserted
    - Surgical procedure information
  - **Denominator data includes:**
    - Counts of patients at risk of acquiring HAI
    - Device-associated HAI: Daily total number of patients admitted and total number of device-days
    - SSI: Total number of patients who underwent surgery and completed follow-up.
      - Every operation is different and some patients have a higher risk of post-operative complications than others

- Patients should be separated in different risk groups for comparison, i.e., risk stratification by using information such as type/duration of procedure, wound class, and ASA scores (e.g., National Nosocomial Infection Surveillance System risk index)
  - Sum daily counts at the end of the surveillance period to calculate the denominator.
- **Handling missing data:**
    - **If unknown status of HAI**, then this person should be excluded from both numerator and **denominator** in rate calculations
    - If number of missing patients at risk excluded >20% of total, then validity may be biased and this should be reported:
      - E.g., “23% percent of patients at risk were excluded from rate due to missing observations”.
      - Hospitals should keep track of most frequently missing type of data and enhance efforts to ensure completeness of data.
- **Key points for following up on results:**
    - IPC team routine activities can assess whether rate of infection seems reasonable based on experience
    - Unusual high rate should be reported and outbreak investigation implemented if indicated\*. An outbreak must be suspected when:
      - Laboratory report of a specimen yields an alert organism and/or a notifiable disease
      - Two or more patients are found to have an infection attributable to a pathogen not previously reported
      - Several people report infections caused by the same organism.
      - Clinicians or ward staff report multiple infections of a similar nature
    - Investigation is essential when major changes from baseline HAI rate are noted
    - Rate of >2 standard deviations from mean could represent unusual occurrence
    - In some situations, only a single case should prompt action, e.g., Ebola, COVID-19, CRO etc. in non-endemic context
    - Rates of infection may vary from previous data due to:
      - Seasonal variations: acute respiratory infections
      - Weekly variations: low rates over weekends and high rates at beginning of week
      - Changes in surveillance methodology or case definitions
      - Random chance
      - Test of significance can be used to identify if infection rate is truly higher or lower than previous rate (e.g.,  $p < 0.05$  or 95% confidence interval does not include 1 ~ statistically significant).

#### **Outline of a surveillance report:**

- Identify author and date of report
- State purpose for conducting surveillance
- Define event, population, setting, and period studied
- State criteria used for defining a case, i.e., case definition
- Explain methodology used to identify cases
- Identify statistical methods and calculations used
- Specify results, i.e., number of cases/events identified and number of populations studied
- Interpret findings in an understandable way
- Describe any actions taken plus prevention and control recommendations.

A process for **risk adjusting** should be followed when surveillance activities are being undertaken.

## \*Summary of outbreak investigation in health facilities

The aim should be to:

1. Determine how the outbreak occurred.
2. Treat the infected patients/persons.
3. Prevent spread of the infection with minimum disruption of activities to patients and staff.
4. Recommend appropriate measures to prevent future occurrences.
5. Conduct contact tracing if it is proven to be external to the health facility.

The steps taken are listed in table 2. Steps may vary depending on the nature of the problem. However, the first and second steps must be done before proceeding.

**Table 11: Outbreak investigation steps**

Step	Actions
Step 1	Establish or verify that an outbreak exists. Do the following: a. Verify diagnosis and/or causative agent of reported case(s). b. Characterize the nature of the disease e.g., signs and symptoms, laboratory findings. Obtain the appropriate laboratory specimens to identify specific disease agent.
Step 2	Confirm the existence of an outbreak: a. Define or estimate the extent and magnitude of the problem, keeping within the range of a specific time period appropriate to the nature of the infection. b. Compare current rates with the usual or baseline rate for the time frame. c. Determine the need for outside assistance/consultation. d. Institute early and appropriate prevention or control measures. e. Obtain and preserve cultures.
Step 3	Continue surveillance for additional cases.
Step 4	Characterize cases by person, place and time to determine if the outbreak is from a common or propagated source.
Step 5	Institute and evaluate other control measures, update and educate the staff as to findings, etc.
Step 6	Provide and disseminate reports as required and maintain pertinent records.

## CRO surveillance

- Take surveillance cultures for asymptomatic CRE colonization investigation. Take these in the emergency department or pre-assessment clinic (when patients meet the risk categories) or upon admission to the ward (in particular, high risk wards) or in the ward for contacts of newly-identified CRE cases).
- Consider including patients with previous CRE colonization/infection, patients with a history of recent hospitalization in endemic CRE settings.
- All patients with suspected signs and symptoms of an infection that could be caused by CRO (for example, bacteraemia or pneumonia), should be surveyed, with special attention to patients most at risk, such as those housed in intensive care, transplant or haemodialysis units, or with previous multidrug antibiotic regimens, etc.
- Types of samples to be collected: sample of faeces, rectal swab or perianal swab (the types of samples are listed in priority order of preference). Perform laboratory testing as per WHO recommendations and available resources.
- Number of samples: minimum one culture; preferably, more than one.
- Aim for a maximum two days turnaround should be the goal for reporting on laboratory results.
- Take surveillance cultures of the environment for CRE-CRAB-CRPsA colonization/ contamination in high endemic settings.

## SSI surveillance

- Conduct SSI surveillance using the recommended approach which involves the following definitions as well as applying the acknowledged risk factors, the American Society of Anaesthesiologists (ASA) score and the wound classification system (wound class) for final reporting.
- Decide who to enrol and to exclude, e.g., defined elective procedures.
- Identify the surveillance duration, depending on the type of surgery.
- Provide information sheets and facilitate assent.
- For peri-operative data collection, provide one data collection form per patient.
- Besides patient information, ASA score and wound classification, surgical procedure information and signs and symptoms of infection, collect data on process measures to identify breaks in adherence to evidence-based SSI prevention recommendations; pre-op bathing, hair removal, surgical skin prep, surgical hand prep, surgical antibiotic prophylaxis, post op antibiotic prescribing, the use of a drain or implant. Monitoring OR traffic may also be useful in assessing discipline.
- Ensure local confidentiality.
- After the surgical operation has taken place, activate the patient post-operative data collection form.
- Across the whole recommended 30-day post-operative data collection period, a total of three reviews of the patient is recommended. Ideally, these would be spaced out so that these occur at roughly the end of week 1, week 2 and week 4. For patients with prolonged follow-up (implanted material), a separate filing system will be needed to keep the records 'active' for the full one-year period, if feasible. If following up over one year, a total of five follow-up interactions (weeks 1, 2 and 4; 6 months; 12 months) is recommended.
- Tools to support SSI surveillance activities can be found at <http://www.who.int/infection-prevention/tools/surgical/en/>

## SSI definitions

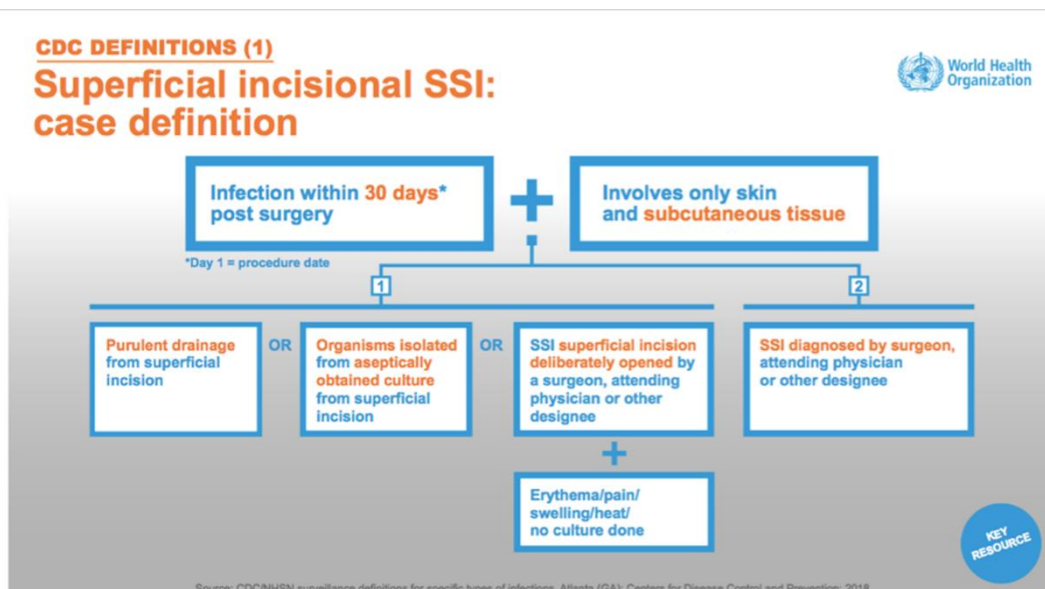


Figure 3: Case definition of Superficial incisional SSI

### CDC DEFINITIONS (2)

## Deep incisional SSI: case definition

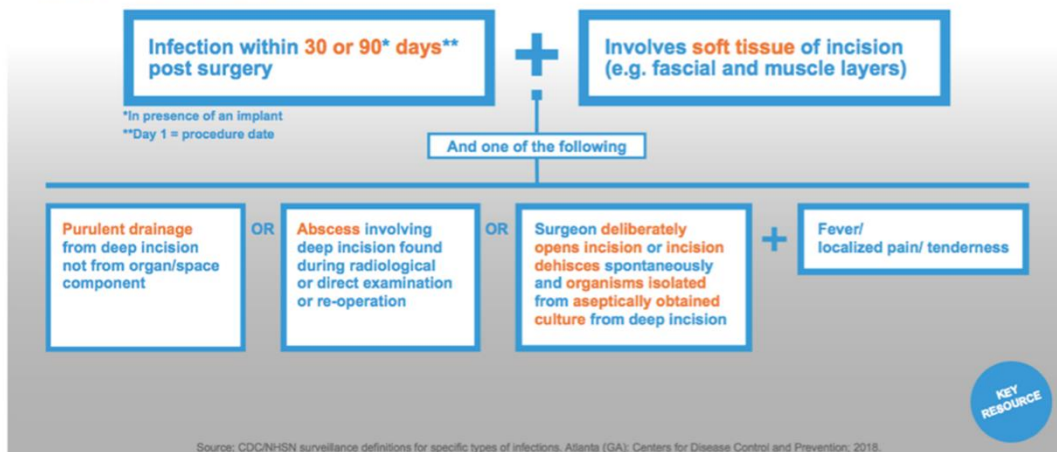


Figure 4: Case definition of Deep incisional SSI

### CDC DEFINITIONS (3)

## Organ/space SSI: case definition

(e.g. osteomyelitis, myocarditis, meningitis, breast abscess, mediastinitis)

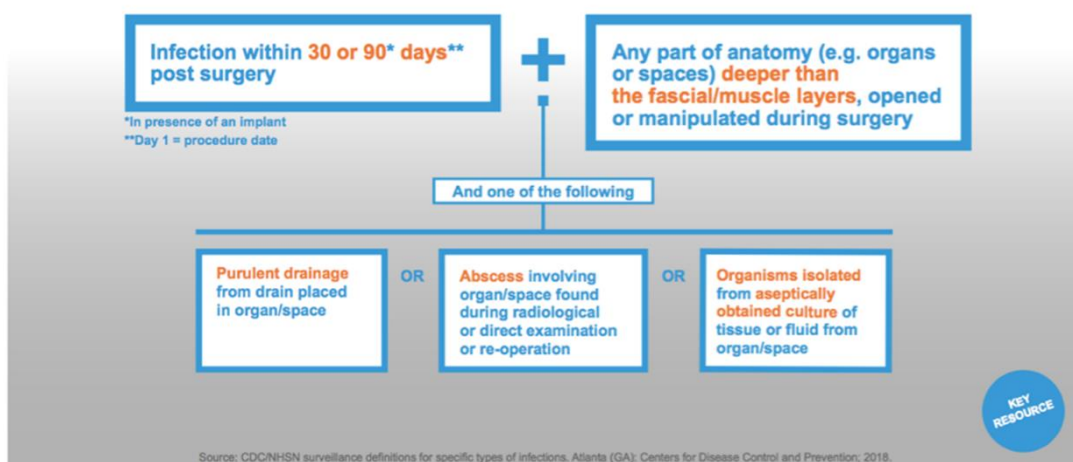


Figure 5: Case definition of Organ/space SSI

**For all other types of surveillance, the following questions can be asked in order to target surveillance:**

- What types of patients receive care or are at greatest risk of infection in the facility? i.e., Intensive care unit (ICU), chronic diseases/terminal illness, old/young age groups etc....
- What are the most common diagnoses? i.e., burns, cardiac insufficiency etc.
- What are most frequently performed invasive procedures? Certain surgeries, insertion of indwelling urinary catheters or vascular catheters (both peripheral and central line), use of respiratory equipment

- What surveillance outcomes need to be targeted for the population? e.g. Outcome indicators such as types of infections, structure and process outcomes such as presence of isolation rooms, hand hygiene, line insertion practices etc.

What is the likelihood of severity of infections and potential to prevent?

## Definitions

### Urinary Tract Infection (UTI)

**Table 12: Urinary tract infections (UTIs)**

<b>UTI-A Microbiologically confirmed symptomatic UTI</b>	<b>UTI-B Microbiologically unconfirmed symptomatic UTI (Does NOT apply to CDC/NHSN but part of ECDC definition)</b>	<b>UTI-C Asymptomatic bacteriuria</b>
≥1 of the following (no other cause): <ul style="list-style-type: none"> <li>❖ fever (&gt;38°C)</li> <li>❖ urgency</li> <li>❖ frequency</li> <li>❖ suprapubic tenderness</li> <li>❖ Altered mental status in elderly</li> </ul> AND	2 of the following (no other cause): <ul style="list-style-type: none"> <li>❖ fever (&gt;38°C)</li> <li>❖ urgency</li> <li>❖ frequency</li> <li>❖ suprapubic tenderness</li> </ul> AND	Do not report
Positive urine culture <ul style="list-style-type: none"> <li>❖ (≥10<sup>5</sup> microorganisms (≤2 species)/ml)</li> </ul>	≥1 of following <ul style="list-style-type: none"> <li>❖ positive dipstick urine</li> <li>❖ pyuria (≥10 white blood cells/ml)</li> <li>❖ Organisms/gram of unspun urine</li> <li>❖ ≥2 urine cultures same uropathogen ≥10<sup>2</sup> organisms/ml</li> <li>❖ <i>physician diagnosis of UTI</i></li> <li>❖ <i>physician treatment of UTI</i></li> </ul>	

### Catheter associated UTI

**Table 13: Catheter associated UTI**

A UTI where an indwelling urinary catheter was in place for >2 calendar days on the date of event
AND
An indwelling urinary catheter was in place on the date of event or the day before. If an indwelling urinary catheter was in place for > 2 calendar days and then removed, the date of event for the UTI must be the day of discontinuation or the next day for the UTI to be catheter-associated

### Blood stream infection (BSI)

**Table 14: Blood stream infection (BSI)**

Recognized pathogen cultured from 1 or more blood culture
<b>OR</b>
Patient has at least 1 of the following signs or symptoms: fever, chills, or hypotension and for patients ≤1 year fever, hypothermia, apnoea, or bradycardia
<b>AND</b>
Common skin contaminant is cultured from 2 or more blood cultures drawn on separate occasions.

CDC/NHSN does not classify secondary BSI within BSI, but within the infection site of origin. Hence, determining the organism becomes essential.



**Table 15: infection site of origin**

Recognized pathogens	Common skin contaminants
<i>Enterococcus spp.</i>	<i>Coagulase Negative Staphylococci (CONS)</i>
<i>E. coli</i>	<i>Diphtheroids</i>
<i>Pseudomonas spp.</i>	<i>Bacillus</i>
<i>Klebsiella spp.</i>	Others
<i>Acinetobacter spp.</i>	
<i>Candida spp.</i>	
Others	

Example data collection forms are available from CDC.

**Central line associated BSI**

Patient must fulfil the following criteria
Laboratory-confirmed bloodstream infection (LCBI) where catheter was in place for >2 calendar days on the date of event
And if removed on date of event
Line in place on date of event or the day before.

**Pneumonia (ventilator acquired pneumonia [VAP] and hospital acquired pneumonia (HAP)**

**Table 16: Pneumonia (ventilator acquired pneumonia [VAP] and hospital acquired pneumonia (HAP)**

At least ONE of the general clinical criteria (can be different for children/infants)			
Fever > 38°C	Leukopenia (<4000 WBC/mm <sup>3</sup> ) or Leucocytosis (≥12,000 WBC/mm <sup>3</sup> )	Altered mental status ≥ 70 years	
And ONE pulmonary clinical criterion [can become TWO] (can be different for children/infants)			
New onset of purulent sputum, or change in character of sputum, or increased respiratory secretions, or increase suctioning requirements	Cough, Dyspnoea or Tachypnoea	Rales or Bronchial breathing	Worsening gas exchange
And ONE radiological criterion			
Patient with underlying diseases (pulmonary or cardiac) has two or more chest x-rays, patient without underlying diseases has one or more chest X-ray; With (1) new or progressive and persistent infiltrates, (2) consolidation, OR (3) cavitation			
And ONE microbiologic criterion (Optional – is not necessary for confirmation of HAI)			
<ul style="list-style-type: none"> <li>Positive quantitative cultures of lower respiratory tract specimen (e.g., bronchoalveolar lavage or protected specimen brushing)</li> <li>Positive blood culture not related to other source of infections</li> <li>Positive pleural fluid culture</li> <li>Positive histopathologic exam</li> </ul>			

- Physician’s diagnosis of pneumonia **alone** is not an acceptable criterion for nosocomial pneumonia.
- Important to distinguish between changes in clinical status due to other conditions, such as myocardial infarction, pulmonary embolism, respiratory distress syndrome, etc.
- Health care-associated pneumonia can be characterized by:
  - **Early onset pneumonia:** Occurs during first four days of hospitalization and often caused by strains of *Moraxella catarrhalis*, *Haemophilus influenzae*, and *Streptococcus pneumoniae*
  - **Late onset pneumonia:** Emerges after 4 days of hospitalisation and more likely caused by gram negative bacilli or *Staphylococcus aureus*.

## Clinical sepsis (unidentified severe infection) definitions

- Must meet the following criterion:
  - Patient has at least 1 of the following clinical signs or symptoms with no other recognized cause: fever, hypotension or oliguria and for infants  $\leq 1$  y fever, hypothermia, apnoea, or bradycardia.
  - Blood culture not done or negative
  - No apparent infection at another site
  - Physician institutes treatment for sepsis

## Considerations for HAI surveillance in facilities with limited resources

- If no dedicated hospital IPC team is available, surveillance can be done by:
  - nursing personnel dedicated to IPC;
  - IPC link nurses or practitioners of other disciplines as relevant (e.g., surgeons, pharmacists);
  - those in other existing surveillance systems; and epidemiology/biostatistics support staff (e.g., initial training, ongoing supervision visits from national level).
- It is accepted that some aspects of the methods and tools to be used may need further adaptation according to local circumstances and resources, e.g., paper systems rather than the gold standard electronic database.
- Balancing patient numbers and the resources available should be a consideration when resources are limited. A larger number of subjects provide more accurate results, however, the question regarding which types of operations to enrol in SSI surveillance, and when, should be a decision reached by local health care institutions.
- Consideration should also be given to assessing the type of data needed to be available at the national level, both ideally and as a minimum.
- If due to resources, for example CRO surveillance is not in place, a point prevalence study can be undertaken. This step helps to evaluate the laboratory capacity for establishing ongoing surveillance, as well as the implications in terms of financial and human resources, equipment procurement, etc.
- Process indicators can be a good place to start until infrastructure and resource building has taken place.

## Additional considerations

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

**Table 17: Improving surveillance through a multimodal strategy**

<p>System change – build it (the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</p>	<ul style="list-style-type: none"> <li>• Put in place/improve laboratory capacity and diagnostic stewardship to reliably conduct surveillance</li> <li>• Put in place/improve a sustainable system to reliably procure and deliver microbiology laboratory equipment, tests and reagents. Through MoHS budget allocation</li> <li>• Develop SOPs describing appropriate procedures for surveillance and screening. Reinforce capabilities and procedures for sample management and (if needed) sample storage and transport to a reference laboratory (off-site).</li> </ul>
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<p>Training and education – teach it</p> <p>(to improve health worker knowledge)</p>	<ul style="list-style-type: none"> <li>• Assess local training needs especially for sample collection and identification in the laboratory and antibiogram interpretation.</li> <li>• Put in place/improve a reliable mechanism for producing/using updated training resources and information for staff with a focus on the importance of diagnostics and diagnostic stewardship, the most appropriate laboratory methods, specimen collection, management (processing-storage-transport), use of microbiological results to establish appropriate IPC measures</li> <li>• Educate health care workers to deal with the ethical implications of screening, as well as how to interact with patients and collect samples with tact and discretion.</li> </ul>
<p>Monitoring and feedback – check it</p> <p>(to assess the problem, drive appropriate change and document practice improvement)</p>	<ul style="list-style-type: none"> <li>• Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) regarding: Reliable availability of microbiology laboratory equipment tests and reagents;</li> <li>• compliance with surveillance and screening SOPs/protocols;</li> <li>• documentation processes;</li> <li>• efficiency of the surveillance system.</li> </ul>
<p>Reminders and communication – sell it</p> <p>(to promote the desired actions, at the right time, including campaigns)</p>	<ul style="list-style-type: none"> <li>• Identify and put in place effective and rapid mechanisms to communicate about a patient's colonization/ infection status at the point of care, for example, electronic reminders/alerts, other flagging systems (on admission/discharge/readmission), taking account of the need to address cultural aspects and local languages.</li> <li>• Use data from surveillance to communicate about the importance of the problem and of action for improvement.</li> <li>• Flag the infection status of the patient in the clinical chart or the electronic record and link it to IPC activities and antibiotic therapy prescription for appropriate action.</li> <li>• Present infection/screening results in a range of formats.</li> <li>• Highlight unnecessary screening and surveillance activities</li> </ul>
<p>Culture and change – live it</p> <p>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</p>	<ul style="list-style-type: none"> <li>• Discuss HAI surveillance results with senior management by providing data on epidemiology and costs, but also patient stories, to highlight it as a serious patient safety issue that requires tangible action - first of all in the ability of the facility to reliably detect it.</li> <li>• Motivate senior clinicians and nurses to follow SOPs for surveillance and screening by using role models to explain the importance of the problem and the implications of surveillance for prevention and control as well as for correct antibiotic treatment.</li> <li>• Identify champions to promote and role model SOPs for surveillance and screening. <ul style="list-style-type: none"> <li>▪ Promote clinical discussion on the importance of surveillance.</li> </ul> </li> </ul>

### Additional key references used to inform definitions

- CDC definitions source: PAHO HQ Library Cataloguing-in-Publication, Pan American Health Organization, "Epidemiological Surveillance of Healthcare Associated Infections". Washington, D. C.: PAHO, © 2011.
- Singer M, Deutschman CS, Seymour CW, Shankar-Hari M, Annane D, Bauer M, et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). JAMA. 2016;315(8):801-10.

## Chapter 3: Standard Precautions

### Introduction to Standard Precautions

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

#### Standard precautions include:

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

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

### Chapter 3. 1: Hand hygiene

#### Relevant international and national guidance and tools

- WHO guidelines on hand hygiene in health care [https://apps.who.int/iris/bitstream/handle/10665/44102/9789241597906\\_eng.pdf?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/44102/9789241597906_eng.pdf?sequence=1)
- A Guide to the Implementation of the WHO Multimodal Hand Hygiene Improvement Strategy [https://apps.who.int/iris/bitstream/handle/10665/70030/1/WHO\\_IER\\_PSP\\_2009.02\\_eng.pdf?ua=1](https://apps.who.int/iris/bitstream/handle/10665/70030/1/WHO_IER_PSP_2009.02_eng.pdf?ua=1)
- WHO Hand Hygiene Self-Assessment Framework [https://www.who.int/gpsc/country\\_work/hhsa\\_framework\\_October\\_2010.pdf?ua=1](https://www.who.int/gpsc/country_work/hhsa_framework_October_2010.pdf?ua=1)
- Guide to Local Production: WHO-recommended Handrub Formulations [https://www.who.int/gpsc/5may/Guide\\_to\\_Local\\_Production.pdf?ua=1](https://www.who.int/gpsc/5may/Guide_to_Local_Production.pdf?ua=1)
- WHO Five Moments poster [https://www.who.int/gpsc/5may/Your\\_5\\_Moments\\_For\\_Hand\\_Hygiene\\_Poster.pdf?ua=1](https://www.who.int/gpsc/5may/Your_5_Moments_For_Hand_Hygiene_Poster.pdf?ua=1)
- WHO Standard Precautions, hand hygiene e-learning module <https://ipc.qhelearning.org/>

#### Key practice points

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

- Focus on a combination of a supportive infrastructure, the use of reminders (e.g., posters), training and education (consistent with guideline content and relevant to the local clinical workflow to resonate clinicians), monitoring and evaluation (using a valid and reliable approach) and a safety culture, to make it more likely that hand hygiene will be performed in the right way at the right time.
- Use valid and reliable tools for improving hand hygiene (see resource links)
- Promote hand hygiene as the “entrance door” to broader safety and quality improvement. IPC interventions require the consistent practice of preventive procedures, such as hand hygiene.

**Introduction - why do we perform hand hygiene?**

- In the health care environment, infection-causing microorganisms, including those resistant to antibiotics, can be transmitted via hands.
- Hand hygiene carried out at the right moments, using the right method, stops this transmission.
- Hand hygiene relies on a number of factors including the right infrastructure and culture being in place.
- Timely hand hygiene prevents contamination from hands directly to patients and to the health care environment (e.g., linens, surfaces, patient care devices), where hand touch can subsequently lead to further contamination and potential infection in patients.
- Hand hygiene is described as the single most important measure to interrupt the transmission of infection and is the cornerstone of clinical practice that is essential for the prevention of HAI and spread of AMR.

**When to perform hand hygiene**

**Indications and actions – Your 5 Moments for Hand Hygiene**

WHO’s Your 5 Moments for Hand Hygiene outlines when hand hygiene, if performed correctly, will interrupt the spread of potentially harmful microorganisms. These moments are shown in Figure 2 and are also described in Table 4.

**Table 18: WHO Your 5 Moments for Hand Hygiene explained**

<b>Moment</b>	<b>When and Why?</b>
<b>BEFORE TOUCHING A PATIENT</b>	<b>WHEN?</b> Clean your hands before touching a patient when approaching him or her, e.g., to take a pulse, shaking hands, applying and oxygen mask <b>WHY?</b> To protect the patient against harmful germs carried on your hands
<b>BEFORE A CLEAN / ASEPTIC PROCEDURE</b>	<b>WHEN?</b> Clean your hands immediately before performing a clean/aseptic procedure, e.g., wound dressings, catheter insertion, preparing/giving medication <b>WHY?</b> To protect the patient against harmful germs, including the patient’s own germs, entering his or her body
<b>AFTER BODY FLUID EXPOSURE RISK</b>	<b>WHEN?</b> Clean your hands immediately after an exposure risk to body fluids (and after glove removal), e.g., clearing up urine, faeces, vomit, completing a wound dressing <b>WHY?</b> To protect yourself and the health care environment from harmful patient germs
<b>AFTER TOUCHING A PATIENT</b>	<b>WHEN?</b> Clean your hands after touching a patient and his or her immediate surroundings when leaving the patient’s side, e.g., shaking hands, a wash/bed bath, blood pressure <b>WHY?</b> To protect yourself and the health care environment from harmful patient germs
<b>AFTER TOUCHING PATIENT SURROUNDINGS</b>	<b>WHEN?</b> Clean your hands after touching any object or furniture in the patient’s immediate surroundings, when leaving - even without touching the patient, e.g., changing the bed linen <b>WHY?</b> To protect yourself and the health-care environment from harmful patient germs

See 5 Moments image (figure 6)

Benefits of using the 5 Moments:

- They simplify **when** to do hand hygiene
- They are applicable in **any care setting** [https://www.who.int/infection-prevention/tools/hand-hygiene/EN\\_GPSC1\\_PSP\\_HH\\_Outpatient\\_care/en/](https://www.who.int/infection-prevention/tools/hand-hygiene/EN_GPSC1_PSP_HH_Outpatient_care/en/)
- They are **logical** - they integrate hand hygiene action into the workflow
- They are **easy to remember**
- They encourage a **consistent approach** across training and observations of health workers
- They are **consistent with evidenced-based risk assessment** of health care associated infection and spread of drug resistant organisms.

These moments focus on the main risks to patients and health workers in the health care environment; they do not mean that staff should not perform hand hygiene on other occasions, e.g., after using the toilet.

The use of gloves does not replace the need for hand hygiene.

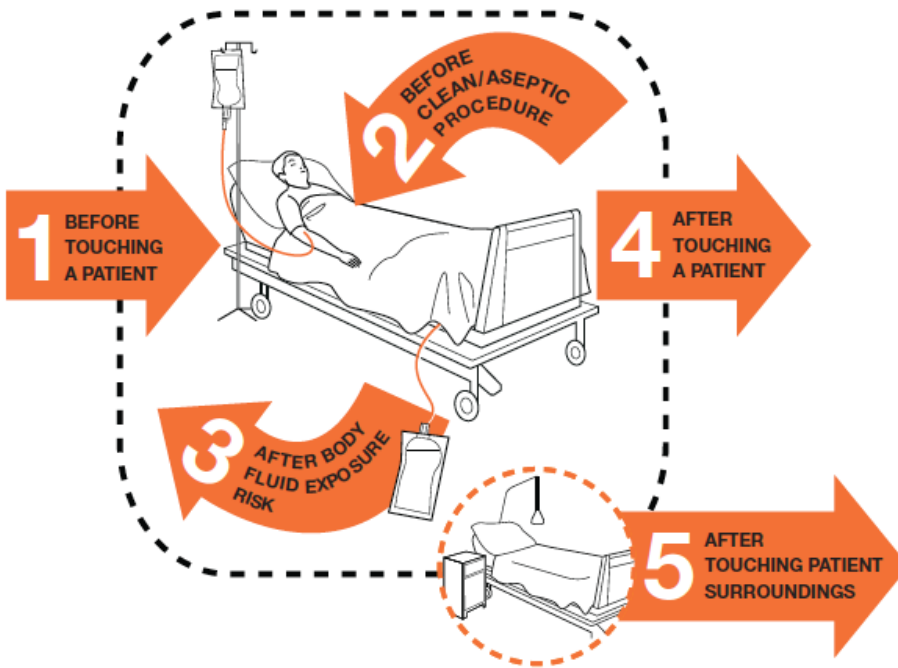


Figure 6: My Five moments for Hand Hygiene

### How to perform hand hygiene

#### Hand Hygiene with Alcohol-Based Hand rub (see figure 3)

Alcohol-based hand rub (ABHR) is the preferred choice for performing hand hygiene if hands are not visibly soiled. It is effective in killing microorganisms, is quicker to perform than hand washing and can be easily accessible at the point where care is delivered (can easily be within arm's reach). An effective alcohol-based hand rub product should contain between 60% and 80% of alcohol and its

efficacy should be proven according to the European Norm 1500 or the standards of the ASTM International (formerly, the American Society for Testing and Materials) known as ASTM E-1174.

Key points when using ABHR:

- Perform if hands are not visibly soiled
- A palmful should be used
- Adequate time is required
- Let it dry

### **Hand Hygiene with Soap and Water (see figure 7)**

The purpose of performing hand washing with soap and water is to remove dirt and organic material and microorganisms from the hands. Soap assists the mechanical removal of debris, loosely adherent microbes, and substances containing fats and oils that are often present on soiled hands. Plain soap is recommended by WHO for routine hand washing, antibacterial soap is not required.

Key points when using soap and water to hand wash:

- Perform if hands are visibly dirty or visibly soiled or contaminated with blood or other body fluids.
- Adequate time is required
- Preferably use liquid soap. Avoid “topping up” dispensers and use refill packets, if available. When using a refill packet, thoroughly clean and dry the dispenser before refilling.
- Hand drying is also important, with a clean, preferably disposable, towel (i.e. a method that does not re-contaminate or irritate the hands). The level of residual moisture left on hands after washing can be an important determinant of pathogens being transmitted from hands to surfaces and vice versa. Warm air dryers for drying hands are not recommended in health care facilities
- It is important that when exposure to spore-forming pathogens is suspected or proven, including outbreaks of *Clostridium difficile* (a bacterial infection that causes severe diarrhoea), the handwashing friction with soap and water will physically remove spores from hands.

Surgical hand antisepsis is addressed in the Operating Room section.

### **How to apply other steps to ensure effective hand hygiene action**

#### **Products**

There are multiple products available for hand hygiene. Local availability may influence selection of hand hygiene products, i.e., soap or ABHR. Whatever is chosen, a product which is of quality and is tolerable and effective should be used.

#### **Hand care**

- Hand care is important to protect the skin from drying and cracking. Cracked skin may encourage microbial colonization and broken areas can present a site of entry for pathogens.
- Hand lotions, creams, or moisturizing skin care products are used to minimize hand hygiene-related dryness and contact dermatitis (a skin rash caused by irritation from a substance such as soap) due to frequent hand washing. Oil-based hand creams (i.e., contains petroleum jelly) should not be used because they may damage latex rubber gloves.
- Communal tubs of hand cream must be avoided as these may contain bacteria over time, and lead to contamination of hands.

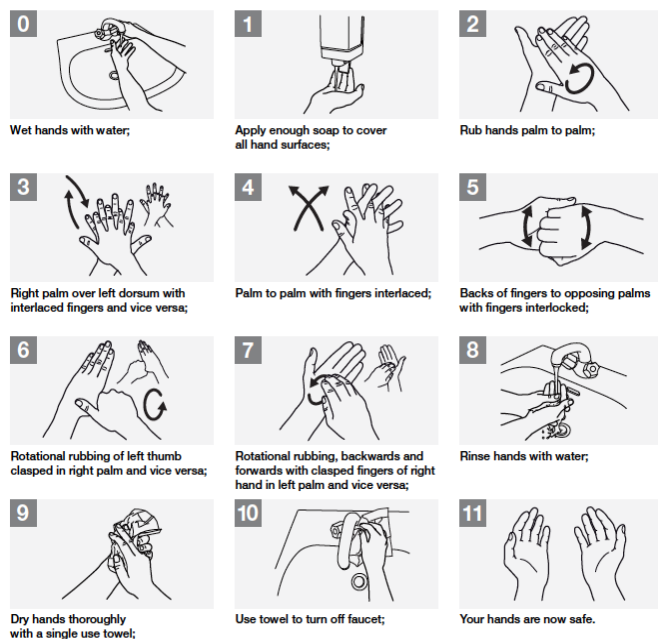
## Fingernails, Nail Polish and Jewellery

- Long fingernails, nail polish, and jewellery are impediments to hand hygiene and can promote bacterial growth on hands (e.g., spaces/crevices under artificial nails and jewellery that are hard to clean, limiting access to beneath nail with long nails).
- Natural fingernails should be kept short. Artificial nails or extenders are discouraged while working in clinical areas.
- Wearing jewellery, including rings, is strongly discouraged.

## How to Handwash?

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB

⌚ Duration of the entire procedure: 40-60 seconds



## How to Handrub?

RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

⌚ Duration of the entire procedure: 20-30 seconds



Figure 7: How to hand wash, how to hand rub

## Lesions and Skin Breaks

To reduce the risk of irritant contact dermatitis and other skin damage, it is important to promote good skin care practices that help to maintain skin integrity, such as:

- Discouraging concurrent use of soap and ABHR
- Promoting ABHR to protect skin integrity (frequent hand washing can lead to irritant contact dermatitis)
- Cuticles, hands, and forearms should be free of major lesions (e.g., ulcer, abscess, and tumour), and cuts. Major cuts and abrasions should be covered with waterproof dressings. Staff with active lesions should not provide direct patient care (or participate in surgery) until lesions are healed.

## Considerations for hand hygiene in facilities with limited resources

- Hand hygiene stations set up where resources are limited can consist of either water (does not need to be drinking-water quality), such as sinks attached to a piped-water supply, refillable water reservoir or clean, covered buckets with taps, equipped with plain soap or AHBR dispensers (hand washing and use of ABHR should never be concurrent).
- In communities where AHBR or soap and water are not available or feasible, using chlorinated water (0.05%) for handwashing is an option for short-term measure. Chlorine solutions are not



routinely recommended as they have harmful occupational hazards. In communities, other alternatives are then ash or water alone in that order.

- Where commercially made liquid soap is not available, locally-made” soapy water” solutions made by mixing detergent with water can be used. The ratio of detergent to water will depend on types and strengths of locally available product. Such products should be certified.
- Where supplies of ABHR are limited or prohibitively expensive, they can be produced locally according to WHO-recommended formulations.
- In settings where water access/quality is an issue, [address annual water service](#) plans.
- Regardless of the type of material used, the washing/rubbing of hands, and the amount of rinsing water in particular, are important determinants in the reduction of pathogen contamination on hands.
- For systems with water in closed containers, avoid dipping hands into the container of water as this can contaminate the water. Someone should pour water over the user’s hands if necessary.
- Soap should be arranged such that water does not pool around it and it can dry thoroughly; soap can be placed on a grate or hung in a net or with a rope.
- For systems with a tap, it is preferable to stop the flow of water without using hands (recontamination, e.g., long-handled taps that can be turned off with an elbow).
- Thoroughly clean and dry containers and buckets daily to avoid build-up of microorganisms. Extra units (containers and buckets) may be needed since the system will not be available for use while being cleaned.
- Refilling ABHR dispensers can promote contamination with spore-forming organisms. To avoid potential spore contamination, disposable bottles are preferred. Reusable bottles may reduce costs and waste management, but should be sterilized. Empty bottles should be brought to a central point to be reprocessed using standard operating procedures.

International evidence supports the implementation of a combination of multiple elements, designed to address the enablers and barriers of hand hygiene behaviour. WHO describes this as a multimodal improvement strategy. The five parts of the multimodal strategy translate recommendations into practice and is accompanied by a wide range of practical tools to support implementation. This has been widely tested for hand hygiene and has since also been applied to other IPC measures.

Each of the five elements of the strategy is equally important. If implemented in isolation it is unlikely that hand hygiene improvement will be sustained, for example, focusing on training and education alone is likely to result in failure if the infrastructure is not in place. Each healthcare facility will need to determine their baseline situation to enable teams to target improvement efforts where they are needed. This introduction to the multimodal strategy now applies throughout the guidelines.

**Table 19: Improving hand hygiene through a multimodal strategy**

<p>System change – build it (the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</p>	<p>WHO Core Components standards - the adequate number and appropriate position of hand hygiene facilities should be implemented in all health care facilities.</p> <ul style="list-style-type: none"> <li>• Put in place/improve the infrastructure, including the reliable availability of ABHR and access to a safe and continuous supply of water, soap, and towels, including a recurring budget required for this. Materials and equipment to perform appropriate hand hygiene should be readily available at the point of care.</li> <li>▪ Put in place/improve a mechanism to ensure hand hygiene products are easily accessible (e.g., within arm’s reach) at the point of care to achieve the Your 5 Moments for Hand Hygiene.</li> <li>▪ Make available functional hand hygiene facilities for all patients, family members, caregivers and any other visitors, as well as within 5 metres of the toilets, and entry/exit of the facility, in waiting and dining rooms and in other public areas.</li> </ul>
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	<ul style="list-style-type: none"> <li>▪ Put in place an up-to-date policy/standard operating procedure that is targeted at local actions including how access to products can be assured.</li> </ul>
<p>Training and education – teach it (to improve health worker knowledge)</p>	<p>A hands on, practical approach is known to improve compliance.</p> <ul style="list-style-type: none"> <li>▪ Put in place the provision of regular (at least annual) training for all HCWs on the importance of hand hygiene, based on the “My 5 Moments for Hand Hygiene” approach, and the correct procedures for hand rubbing and hand washing.</li> <li>▪ Allocate responsibility to check that current training and education programmes include the correct hand hygiene recommendations - map guideline recommendations to training content.</li> <li>▪ Assess training needs.</li> <li>▪ Identify the expertise required to conduct training.</li> </ul>
<p>Monitoring and feedback – check it (to assess the problem, drive appropriate change and document practice improvement)</p>	<ul style="list-style-type: none"> <li>• Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities)</li> <li>• WHO Core Component standards - national IPC monitoring and evaluation programme should be established to assess the extent to which standards are being met and activities are being performed according to the programme’s goals and objectives. Hand hygiene monitoring with feedback should be considered as a key performance indicator at the national level.</li> <li>• Monitoring and reporting on hand hygiene compliance includes: <ul style="list-style-type: none"> <li>○ Conduct direct observation by trained observers using the WHO observation form and protocol</li> <li>○ Consider self-reporting by staff or by patients.</li> <li>○ Consider indirect methods (e.g., monitoring product consumption or number of times sinks or dispensers are used)</li> <li>○ Undertake acceptability and tolerability of products (involve staff in choosing hand hygiene products to secure their buy-in)</li> <li>○ Availability of products at the point of care, as well as reminders.</li> </ul> </li> </ul> <p>The WHO Hand Hygiene Self-Assessment Framework also provides a comprehensive way to improving all aspects related to sustained improvement.</p>
<p>Reminders and communication – sell it (to promote the desired actions, at the right time, including campaigns)</p>	<ul style="list-style-type: none"> <li>▪ Prompt and remind HCWs about the importance of hand hygiene and about the appropriate indications and procedures for performing it by using well placed, accurate reminders which re checked and replaced regularly</li> </ul>
<p>Culture and change – live it (to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</p>	<ul style="list-style-type: none"> <li>▪ Create an environment and the perceptions that facilitate awareness-raising about patient safety issues while guaranteeing commitment to all components of hand hygiene improvement as a high priority at all levels, including: <ul style="list-style-type: none"> <li>○ Active participation at both the institutional and individual levels.</li> <li>○ Awareness of individual and institutional capacity to change and improve (self-efficacy).</li> </ul> </li> <li>▪ Partnership with patients and patient organizations/local leaders.</li> <li>▪ Provide a hierarchy of responsibilities and demonstrate leadership for hand hygiene action.</li> </ul>

## Chapter 3.2: Personal Protective Equipment (PPE)

### Relevant international and national guidance and tools

- WHO how to put on and take off PPE <https://www.who.int/csr/resources/publications/putontakeoffPPE/en/>
- WHO Glove Use Information Leaflet [https://www.who.int/gpsc/5may/Glove\\_Use\\_Information\\_Leaflet.pdf](https://www.who.int/gpsc/5may/Glove_Use_Information_Leaflet.pdf)
- WHO guidelines on hand hygiene in health care [https://apps.who.int/iris/bitstream/handle/10665/44102/9789241597906\\_eng.pdf?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/44102/9789241597906_eng.pdf?sequence=1)
- Rational use of personal protective equipment for coronavirus disease (COVID-19) and considerations during severe shortages [https://www.who.int/publications/i/item/rational-use-of-personal-protective-equipment-for-coronavirus-disease-\(covid-19\)-and-considerations-during-severe-shortages](https://www.who.int/publications/i/item/rational-use-of-personal-protective-equipment-for-coronavirus-disease-(covid-19)-and-considerations-during-severe-shortages)
- WHO Standard Precautions, PPE e-learning module <https://ipc.qhelearning.org/>

### Key practice points

- Use PPE to protect against exposure to body fluids that may contain potentially pathogenic microorganisms.
- Perform the correct, safe procedures to don and doff PPE.
- Apply the WHO *Your 5 Moments for Hand Hygiene* to clean hands at the right time even when PPE is worn.
- Apply recommended modifications in order to rationally and safely use PPE when resources are limited.
- Focus on a combination of a supportive infrastructure, the use of reminders (e.g., posters), training and education (consistent with guideline content), monitoring and evaluation (using a valid and reliable approach) and a safety culture, to make it more likely PPE will be worn in right way at the right times.

### Introduction - why do we use PPE?

- Personal protective equipment (PPE) is one part of standard precautions for the safe delivery of healthcare when exposure to body fluids is anticipated and the practice relies on correct and consistent use from individuals.
- PPE, when used correctly, provides a physical barrier that protects the eyes, nose, mouth, other mucous membranes, skin and clothing of the healthcare workers from body fluids that may contain potentially pathogenic microorganisms, such as blood, vomit, urine, semen, sweat and saliva. A range of organisms can be found within body fluids (refer to Chapter 4 transmission-based precautions).
- PPE reduces the risk of contamination to hands, the risk of germ dissemination to the environment and of transmission from the health-care worker to the patient and vice versa, as well as from one patient to another.
- PPE therefore includes use of gloves, aprons, gowns, medical masks, respirators, boots and eye protection according to risk. The correct putting on, removal and discarding of PPE also prevent the transmission of microorganisms to patients, other healthcare staff and the environment.

### When to use PPE?

Before undertaking any activity or procedure, HCWs should wear the PPE that provides appropriate protection against the risks associated with the procedure or task being undertaken.

PPE should be readily available and accessible at all times to the health care workers in the health facility. PPE should also be available for caregiver/visitors who are providing care to patients in the facility and who may be exposed to body fluids (see table 6).

**Table 20: Type of PPE and when to use**

Type of PPE:	Indication for use:
Non-sterile gloves (examination gloves) – non powdered latex or nitrile gloves are recommended	When a HCW is performing patient care activities that may involve blood or other body fluids or handling of contaminated materials, e.g., when cleaning, gloves should be used (this includes contact with mucous membrane and non-intact skin).
Sterile gloves (surgical gloves) – latex or nitrile	<p>Mostly used for surgery but also other invasive procedures that require an aseptic procedure. They are disposable and individually wrapped items.</p> <p>In the case of double-gloving, a routine change of the outer gloves during long surgeries is often recommended by health care practitioners. However, there is no evidence to support these practices.</p> <p>Gloves for Obstetric Use - elbow-length sterile obstetric gloves can be used for obstetrical procedures given the increased risk of exposure to large amounts of bodily fluid.</p>
Gown  Fluid-resistant and impermeable gowns offer fluid protection and are advised for body fluid exposure and are usually long sleeved.	<p>When performing a procedure that can involve body fluid exposure, a fluid-resistant gown should be used, i.e., during procedures likely to generate contamination from body fluids.</p> <p>During surgical procedures, a <i>sterile</i> surgical gown is worn to protect the sterile field and prevent transfer of microorganisms from HCW to patient, in addition to protecting the wearer.</p>
Plastic Apron	In routine care, if splashes of body fluid are likely, use of plastic apron may also be necessary on top of the cloth reusable gowns (if they are being used e.g., during delivery or clean/aseptic procedures or invasive surgical procedures).
<p>Medical Mask (may also be known as a surgical mask)</p> <p>Masks made from based cotton/material or paper are not fluid-resistant and are not considered an effective barrier within the health care setting.</p>	<p>Masks provide a physical barrier to prevent splashes from reaching a HCW's mucous membranes, e.g., during procedures likely to generate splashes into a HCW's mouth and/or nose. Masks also act as a barrier to block oral secretions from HCW to patient (e.g., during surgery, lumbar punctures).</p> <p>Any time splashing is anticipated, eyes must be protected as well; thus, masks are worn in combination with other PPE (e.g., goggles).</p> <p>Some patients with respiratory symptoms should wear masks to protect others.</p> <p>For information on the use of masks and respirators for acute respiratory infections refer to the TBP section. Note, respirators may be required for certain aerosol generating procedures even when patient is not on airborne precautions.</p> <p>During an outbreak, use of masks should be guided by disease specific guidelines.</p>
<p>Face shield, goggles or safety glasses</p> <p>Choose protective eyewear that fits well on the face, is comfortable, and allows sufficient peripheral vision. Ensure a secure fit and to avoid excessive fogging; when possible, use eyewear with anti-fog coating.</p>	<p>If splashes of blood and body fluid are likely to eyes (e.g., during delivery or invasive surgical procedure), then face shield, goggles or safety glasses should be used.</p> <p><b>Note:</b> Personal eyeglasses and contact lenses are NOT considered protective eyewear. A mask with a fitted plastic shield for the eyes may also be available and is acceptable.</p>

## How to use PPE

General principles on how to use PPE safely:

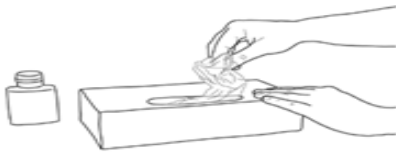
- Before donning, perform hand hygiene (this action will relate to the 5 Moments for Hand Hygiene)
- Consider appropriateness of PPE for the task
- Check PPE for small holes or tears and expiry date
- Check PPE for the proper fit/size (to minimize adjusting during patient care)
- Any item that ties should be tied securely, but not too tight that extra manipulation will be needed to take it off
- Once PPE has been put on, avoid touching or adjusting it. HCWs should avoid touching their face to protect their mucous membranes from potential contamination.
- If PPE becomes heavily soiled with blood or body fluids, it should be changed. PPE should also be changed if it becomes damaged (e.g., glove tears, gown rips). After any time, PPE is removed, hand hygiene should be performed.
- Safely remove PPE immediately after use. When PPE is removed, there is potential for contamination from PPE to hands, mucous membranes, clothing, and skin. This is why in general the dirtiest PPE is removed first. PPE should be removed slowly and carefully and discarded in the appropriate waste bin.
- Ensure the outside of PPE does NOT touch skin or any part of the body.
- Perform hand hygiene after immediately PPE is removed and disposed of.

How to put on and remove gloves

- Perform hand hygiene (this action will relate to the 5 Moments for Hand Hygiene)
- Refer to Figure 4.
- If a gown is being worn, ensure the cuff is covered by the glove.
- If full PPE is being worn, gloves should be first in the doffing process.

When the hand hygiene indication occurs before a contact requiring glove use, perform hand hygiene by rubbing with an alcohol-based handrub or by washing with soap and water.

#### I. HOW TO DON GLOVES:



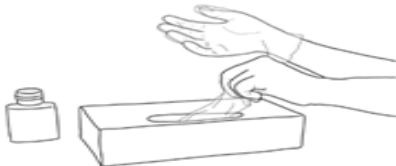
1. Take out a glove from its original box



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

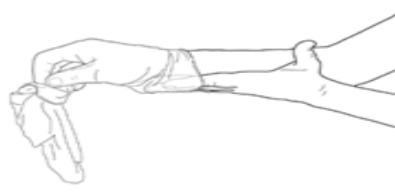


6. Once gloved, hands should not touch anything else that is not defined by indications and conditions for glove use

#### II. HOW TO REMOVE GLOVES:



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 8: How to don gloves

### How to put on and remove basic PPE (see annexe 8 & 9)

#### How to use a masks/face shield

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

### **Safely and properly donning extended PPE (refer to Annex 10)**

- Perform hand hygiene
- Prepare all needed materials
- Donning boots
- Hand sanitizer your hands
- Donning inner pair of gloves
- Donning gown
- Donning head cover
- Donning face mask
- Donning goggles
- Donning face shield
- Donning apron
- Donning outer pair of gloves

### **Safely and properly doffing PPE (refer to Annexe 11)**

- Perform hand hygiene
- Doffing the outer pair of gloves
- Perform hand hygiene
- Doffing the reusable apron
- Perform hand hygiene
- Doffing gown
- Perform hand hygiene
- Doffing face shield
- Doffing goggles
- Perform hand hygiene
- Doffing face mask
- Perform hand hygiene
- Doffing head cover
- Perform hand hygiene
- Doffing inner pair of gloves
- Perform hand hygiene

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

- Risk assessing PPE use is part of its rational use. Overuse is a waste of resources.
- The use of double gloving has not been found to be evidence based and can waste resources.
- The use of heavy-duty gloves for cleaning should be applied rather than the inappropriate use of medical gloves.
- Vinyl gloves are acceptable for short procedures/tasks (e.g., suctioning endotracheal secretions, removing IV lines) that involve minimum risk of glove tears, have low risk of exposure to contaminants, and involve minimal stress on the gloves, if they are the only type of examination glove available. They are however not routinely advised for exposure to body fluids.
- It has been suggested, during the COVID-19 pandemic, that extended use of medical masks where community transmission is prevalent is acceptable. A risk assessment must be undertaken (see also chapter 4 transmission-based precautions). Health care facilities must outline temporary strategies for rational but safe use of PPE (including extended use, reprocessing and alternative PPE) where necessary.
- Where efficient decontamination services exist, reusable (non-disposable) PPE is acceptable

## Additional considerations

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

PPE should be:

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

**Table 21: Improving PPE use through a multimodal strategy**

<p>System change – build it (the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</p>	<ul style="list-style-type: none"> <li>▪ Put in place/improve systems to <u>reliably procure, distribute and manage PPE, alcohol based hand rub (ABHR), soap and towels, environmental cleaning products and waste disposal</u> (functional collection containers) products, including a dedicated budget.</li> <li>▪ Provide <u>SOPs</u> for PPE use at the health facility, including safe use and replacement of supplies and hand hygiene, cleaning and waste disposal actions.</li> <li>▪ As PPE is less effective than replacement or removal of hazards, engineering controls, and administrative controls, these aspects should be addressed within system changes.</li> </ul>
<p>Training and education – teach it (to improve health worker knowledge)</p>	<ul style="list-style-type: none"> <li>▪ Provide practical, regular training to HCWs and visitors caring for patients. Ensure training is in line with guideline content.</li> <li>▪ Allocate responsibility to check that training needs are met and that training is up to date.</li> </ul>
<p>Monitoring and feedback – check it (to assess the problem, drive appropriate change and document practice improvement)</p>	<ul style="list-style-type: none"> <li>• Put in place/improve regular IPC assessments by IPC focal person and other associated/supporting IPC personnel, including monitoring, reporting and feedback mechanism (roles and responsibilities) focused on compliance with PPE use and its reliable availability at the point of use.</li> <li>• Monitor the possibility of allergies in HCWs, e.g. to latex gloves.</li> <li>• Monitor on occupational health hazard.</li> <li>• Perform and promptly report on staff knowledge and perceptions on rational and safe use of PPE.</li> </ul>
<p>Reminders and communication – sell it (to promote the desired actions, at the right time, including campaigns)</p>	<ul style="list-style-type: none"> <li>▪ Prompt and remind HCWs, patients, caregivers and visitors about the correct PPE use by using well placed, accurate reminders which are checked and replaced regularly.</li> </ul>
<p>Culture and change – live it (to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</p>	<ul style="list-style-type: none"> <li>▪ Create an environment that facilitates and role models appropriate PPE use.</li> <li>▪ Use champions/IPC link personnel and role models to promote correct PPE use.</li> </ul>



## Chapter 3.3: Environmental cleaning

### Relevant international and national guidance and tools

- Essential environmental health standards in health care  
[https://apps.who.int/iris/bitstream/handle/10665/43767/9789241547239\\_eng.pdf?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/43767/9789241547239_eng.pdf?sequence=1)
- The CDC/ICAN Best Practices for Environmental Cleaning in Healthcare Facilities: in Resource-Limited Settings  
<https://www.cdc.gov/hai/pdfs/resource-limited/environmental-cleaning-RLS-H.pdf>
- WHO Decontamination and Reprocessing of Medical Devices for Health-care Facilities  
<https://www.who.int/infection-prevention/publications/decontamination/en/>
- WHO Implementation manual to prevent and control the spread of carbapenem-resistant organisms at the national and health care facility level: interim practical manual supporting implementation of the Guidelines for the prevention and control of carbapenem-resistant Enterobacteriaceae, *Acinetobacter baumannii* and *Pseudomonas aeruginosa* in health care facilities  
<https://apps.who.int/iris/handle/10665/312226>
- WHO Water and sanitation for health facility improvement tool (WASH FIT) A practical guide for improving quality of care through water, sanitation and hygiene in health care facilities  
<https://apps.who.int/iris/bitstream/handle/10665/254910/9789241511698-eng.pdf?sequence=1>
- WHO Standard Precautions environmental cleaning e-learning module  
<https://ipc.qhelearning.org/>

### Key practice points:

- Always clean first! Cleaning is an essential step prior to any disinfection process to remove dirt, debris, and other materials, as dirty surfaces decrease the effectiveness of chemical disinfectants.
- Perform scrubbing (frictional cleaning) as the best way to physically remove dirt, debris, and microorganisms.
- Use cleaning products which are effective for environmental cleaning:
  - The use of neutral detergent solution is essential for effective cleaning, as it removes dirt while improving the quality of cleaning by preventing the build-up of biofilms.
- Focus on the direction of cleaning:
  - From the least soiled areas (cleanest) to the most soiled areas (dirtiest) so that dirtiest areas are cleaned last.
  - From higher levels to lower levels so that debris may fall on the floor and is cleaned last.
- Avoid large-surface cleaning methods that produce mists or aerosols, or disperse dust in patient-care areas, e.g., dry sweeping, mopping, spraying or dusting.
- Do not perform routine bacteriological monitoring to assess the effectiveness of environmental cleaning; this is not generally required.
- Focus on a combination of a supportive infrastructure, the use of reminders (e.g., posters), training and education (consistent with guideline content), monitoring and evaluation (using a valid and reliable approach) and a safety culture, to make it more likely that environmental cleaning will be reliably effective.

### Introduction - why we perform environmental cleaning

- In the health care environment, there are a diverse number of microorganisms. Most of these microorganisms are harmless, but some cause disease in susceptible hosts.
- Microorganism survival and persistence in the environment depends on various factors, including type of surface, presence of organic matter, bioburden, temperature, and humidity.
- Because several common HAI pathogens are known to persist on environmental surfaces for weeks and months (i.e., potential reservoir), it is likely, but not certain, that surfaces play a role in disease transmission.
- Cleaning is the physical removal of foreign material (e.g., dust, soil) and organic material (e.g., blood, secretions, excretions, microorganisms). Cleaning physically removes rather than kills microorganisms. It is accomplished with water, detergents, and mechanical action.

- Cleaning and disinfection of environmental surfaces is fundamental in reducing microbes in the health care environment.

When to perform environmental cleaning

**Table 22: Recommended frequencies for cleaning and disinfection**

Surfaces	Frequency
<b>High touch surfaces are touched frequently</b> (e.g., light switches, bed rails, patient toilets, door knobs, patient monitoring equipment, sink handles, etc) Sinks, countertops are also frequently contaminated Low touch surfaces will be less contaminated	<ul style="list-style-type: none"> <li>• Identify high touch surfaces vs low touch surfaces (less frequently touched by health workers and patients)</li> <li>• Clean and disinfect regularly (e.g., at least daily) and whenever visibly soiled</li> <li>• Clean and disinfect more frequently as indicated (e.g., patient on transmission-based precautions)</li> <li>• Clean and disinfect upon discharge or transfer (terminal cleaning)</li> </ul>
<b>Other surfaces</b> (e.g., walls, windows, ceilings, doors)	<ul style="list-style-type: none"> <li>• Clean regularly (e.g., weekly)</li> <li>• Clean whenever there is soiling or spills (and disinfect if indicated)</li> </ul>
<b>Patient toilets – private</b>	<ul style="list-style-type: none"> <li>• Clean and disinfect at least daily and whenever visibly soiled</li> </ul>
<b>Patient toilets – public or shared</b>	<ul style="list-style-type: none"> <li>• Clean and disinfect at least twice daily and whenever visibly soiled</li> </ul>
<b>Floors</b>	<ul style="list-style-type: none"> <li>• Mop floors regularly (e.g., daily), or more often as indicated</li> <li>• Mop upon discharge or transfer (terminal cleaning)</li> </ul>
<b>Other items</b>	<ul style="list-style-type: none"> <li>• All non-critical care equipment (i.e., stethoscopes, blood pressure cuffs, bedpans, etc.) that come into contact with intact skin must be cleaned and disinfected between use.</li> </ul>

**Table 23: Recommended cleaning frequencies for non-patient and patient care areas**

Area	Frequency	Method	Process
Non-patient care areas (i.e., administrative offices)	Agreed schedule	Clean	Waste management, floors, damp-dusted
Outpatient waiting area/admission	At least once daily	Clean	High touch surfaces & floors
Outpatient consultation rooms	At least twice (2x) daily	Clean & disinfect	High touch surfaces & floors
Procedural rooms (minor operative procedures)	Before and after each procedure	Clean & disinfect	High touch surfaces, floors, and procedure table Entire room.
	End of day/terminal cleaning	Clean & disinfect	
General inpatient wards – patient transfer or discharge	Terminal clean	Clean & disinfect	Entire room/patient zone
Isolation rooms – contact/droplet precautions	Twice daily and as needed	Clean & disinfect	Any surface visibly soiled with blood or body fluids, high-touch surfaces and floors.
Isolation rooms – airborne precautions	Daily and as needed	Clean (neutral detergent and water)	High touch surfaces and floors.
Operating theatre	Before the first procedure	Clean & disinfect	Target areas where dust or debris collected overnight
	Between cases	Clean & disinfect	High touch surfaces, floors, spills/body fluids, linen, & waste containers.
	End of day/terminal cleaning	Clean & disinfect	Entire room.

Area	Frequency	Method	Process
Intensive care units	At least twice (2x) daily	Clean & disinfect	High touch surfaces, floors, and low touch surfaces (end of day)

Terminal cleaning is cleaning and disinfection after the patient is discharged or transferred to ensure the removal of organic matter and elimination of microbial contamination.

**Table 24: Required PPE for performing environmental cleaning tasks**

Type of cleaning task	Required PPE for cleaning staff
Routine cleaning	None (unless spills or contamination risk—see below)
Terminal cleaning	Use of reusable rubber gloves
Blood and body fluid spills and high contamination risk areas (e.g., cleaning bed of an incontinent patient, labour and delivery wards)	Gown and/or plastic apron Reusable rubber gloves Face mask with either goggles or face shield Closed toed shoes/boot
Droplet precautions (routine and terminal cleaning)	Gown and/or plastic apron Reusable rubber gloves Face mask with either goggles or face shield
Contact precautions (routine and terminal cleaning)	Gown and/or plastic apron Reusable rubber gloves
Airborne precautions (routine and terminal cleaning)	Respirator (N95 or FFP2), fit tested, Reusable rubber gloves
Preparation of disinfectant products and solutions	According to specifications in safety data sheets (SDS) (manufacturer instructions) If SDS not available, then: • Chemical-resistant gloves (e.g., nitrile) • Gown and/or apron • Face mask with either goggles or face shield

Adapted from CDC/ICAN manual- pg. 36

### How to perform environmental cleaning

Understanding the equipment to use before planning to clean is important. Generally, it includes the use of; cleaning and disinfection products, reusable/disposable supplies (table 11) and equipment and PPE and hand hygiene products. Subsequently, cleaning frequencies should be adhered to.

### PPE and hand hygiene action for safe cleaning:

- PPE (gloves, gowns, aprons, surgical masks and particulate respirators) should be available to all staff performing cleaning duties
  - Gloves (generally heavy-duty utility gloves) are worn when handling hazardous materials or cleaning surfaces that are visibly soiled with blood or body fluids
  - Face masks and eye protection (e.g., surgical mask or respirator and goggles/face shield) are worn when there is a risk of splashes or sprays of chemicals (e.g., chemical spill) including during preparation, or blood or other body fluids (e.g., emptying dirty buckets into latrine)
  - Rubber boots are worn when using hazardous chemicals or to provide additional protection when working in wet environments. Closed toed shoes should always be worn
- PPE is not indicated for cleaning non-patient care areas (e.g., offices).
- Perform hand hygiene immediately before putting on gloves and directly after taking them off (i.e., this should always be considered as a mandatory practices)
- Routine use of gloves is recommended if:
  - the patients in the area are on transmission-based precautions
  - there is risk of hand contact with blood or body fluids
  - there is prolonged contact with disinfectants (e.g., terminal cleaning)
- When use of gloves is indicated always change them between each cleaning session (e.g., routine cleaning of a patient zone under contact precautions, terminal cleaning)

- Recap on tables 8-10 for further recommendations on what PPE is required when performing environmental cleaning in specific areas.

**Table 25: Cleaning and disinfection – the products to use and how to perform the action**

Action to take	Product to use	Properties/other actions to consider
<p>Cleaning</p> <p>Before disinfection, if disinfection is required, use a cleaning product to remove all organic material and soil.</p> <p>Conduct a visual inspection prior to commencing and make sure the environment is clutter free.</p> <p>Work from the least soiled areas (cleanest) to the most soiled areas (dirtiest) so that dirtiest areas are cleaned last, and always work in a systematic way</p> <p>Work from higher levels to lower levels.</p>	<p>Cleaning agents that contain detergents that possess a cleaning action (e.g., soap) to remove dirt and debris from surfaces</p>	<p>Select neutral detergents (pH between 6 and 8) that are easily soluble (in warm and cold water)</p> <p>Cleaning cloths should never be 'double-dipped' into containers used for storing cleaning solutions (to avoid the solution from being contaminated)</p>
<p>Disinfection</p> <p>Ensure the product remains on the surface being disinfected for the appropriate contact time.</p>	<p>An agent that will inactivate or kill microorganisms on surfaces (if organic or inorganic materials are present as cleaning has not been performed, the active ingredient can be rendered ineffective)</p> <p>Combined detergent-disinfectant products can be used in place of separate detergent and disinfectant products, however, a rinse step to remove residues is periodically recommended</p>	<p>Disinfectants should be diluted to the correct concentration</p> <p>Commonly used disinfectants in use in health care facilities include:</p> <ul style="list-style-type: none"> <li>Chlorine solutions 0.1%</li> <li>Alcohol (70%) isopropyl or ethyl alcohol for small surfaces</li> <li>Quaternary ammonium compounds (e.g., benzalkonium chloride)</li> </ul>

Minimize contamination of cleaning solutions by not putting already used cloths back into the cleaning solution, which can result in contamination of the cleaning solution and transferring of bacteria from one surface to another through the cloth. Squeeze bottles are preferred, see below.

Reusable/disposable supplies and their appropriate use (including disinfectants)

- Environmental cleaning materials and equipment quickly become contaminated. Regular and routine reprocessing (clean, disinfect and dry) of cleaning materials and equipment is required, i.e., after each time they are used
- Regularly inspect and/or replace all reusable equipment when needed
- When preparing the disinfectant, be sure to follow the manufacturer's instructions. Chlorine is commonly used in the Sierra Leonean context, and for this reason, see Annex 1 for 'how to prepare'.

Containers/buckets:

- Portable cleaning containers for solutions should be clean, dry, appropriately-sized, labelled, and dated

- Squeeze bottles are preferred over spray bottles for applying cleaning or disinfectant solutions directly to cloths
- A two-bucket system (routine cleaning) should be available: one bucket contains a detergent or cleaning solution and the other contains rinse water. This is known as the two-bucket (or step) process.
- A three-bucket system (for added disinfection) should also be available: one bucket contains the detergent or cleaning solution; one contains rinse water and one the disinfectant or disinfectant solution.

Floor cleaning supplies also include mop heads (cotton or microfibre). Never shake mop heads or cleaning cloths. See table 13 for recommended methods for cleaning floors.

**Cloths:**

- Surface cleaning cloths that are cotton or microfibre. These can be color-coded to reinforce the two-step process
- Always use fresh cleaning cloths for each cleaning session.
- Change cleaning cloths when no longer saturated for a new cloth. Store soiled ones in a dedicated bucket for reprocessing.
- Change cleaning cloths between each patient zone (patient zone contains the patient and his/her immediate surroundings (i.e., use a new cloth for each patient bed).
- Never double dip cleaning cloths into portable containers (i.e., squeeze bottles or buckets) used for cleaning solutions/disinfectants
- Never leave environmental cleaning materials and equipment soaking in buckets.

**Spillage management**

For cleaning small and large spillages refer to table 26.

**Table 26: Procedure for cleaning small and large spills**

<b>Small spills – splashes and drips</b>
<p>Immediately attend to any each body fluid spills:</p> <ul style="list-style-type: none"> <li>• Wear non-sterile gloves for this procedure.</li> <li>• Wipe the area immediately with a paper towel/absorbent cloth</li> <li>• Discard immediately as clinical/infectious waste</li> <li>• Disinfect using 0.5% chlorine solution</li> <li>• Dry the surface with disposable paper towels</li> <li>• Discard gloves and paper towels as clinical/infectious waste Immediately wash hands with soap and water and dry.</li> </ul>
<b>Larger spills</b>
<ul style="list-style-type: none"> <li>• Wear heavy duty gloves and appropriate PPE including a face shield if there is a risk of splashing.</li> <li>• Use absorbent towels as single use to cover and remove spill</li> <li>• Clean area with soap and water first, rinse and then disinfect</li> <li>• Use a separate cloth soaked in disinfectant solution, disinfect and for 5-10 minutes contact time. Don't pour the solution directly onto the spill—it may cause splashing and widen the area of contamination.</li> <li>• Leave the wet surface to dry</li> <li>• Remove PPE and dispose accordingly.</li> <li>• Immediately wash hands with soap and water and dry.</li> </ul>

**Table 27: Recommended methods for cleaning floors**

Method of cleaning	Description
Wet mopping	<b>Two-bucket system:</b> clean cloths or mops are wetted with a cleaning solution contained in one bucket. A second bucket contains clean water for rinsing. Change the cleaning solution when it becomes visibly dirty.
	<b>Three bucket system:</b> On top of the double-bucket technique, use a third bucket with disinfectant solution to disinfectant solution

### Considerations in facilities with limited resources

- Equipment used for cleaning and/or disinfection varies based on facility availability.
- In settings where water access/quality is an issue, [address annual water service](#) plans.
- Educate patients and caregivers on proper techniques or basic principles as often they can be involved in maintaining the patient care area.
- Although new equipment is ideal, using old clothes which have been laundered and cutting them into cloths can be an interim solution.
- Also see sections on PPE and hand hygiene for additional recommendations for settings with limited resources.

### Additional considerations

- Cleaning guides/aides or checklists are considered helpful in the process (daily/weekly cleaning schedule and cleaning sign logbook)
- Staff that perform environmental cleaning duties play an important role in the prevention and control of infection in health care facilities
- Cleaning and disinfection procedures for patients on transmission-based precautions may require more frequent cleaning and disinfection, based on the degree of environmental contamination and for certain enteric infectious agents
- During a suspected or confirmed outbreak, routine cleaning and disinfection procedures should be reviewed by the facility. Additional trained staff may be needed to increase cleaning intensity depending on the scope of the outbreak and the volume of patients at the facility
- Cleaning and disinfection practices should be monitored to identify opportunities for improvement and provide feedback to cleaning staff. Monitoring practices include:
  - Direct observation of cleaning and disinfection: ideal, but time consuming.
  - Visual inspection: Practical, easy to implement, but subjectivity in interpreting quality of cleaning.
  - Fluorescent markers: An invisible fluorescent mark is applied to a surface and examined with an ultraviolet light after cleaning. If the mark is visible under the light, re-cleaning is indicated
- Routine bacteriological monitoring to assess the effectiveness of environmental cleaning, is not require. In outbreak scenarios this may be considered as a tool to assist in finding an epidemiological link
- The use of a single product throughout a health care facility can simplify training and standardize practice.

**Table 28: Environmental cleaning & disinfection using a multimodal strategy**

System change – build it <i>(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</i>	<ul style="list-style-type: none"> <li>▪ Put in place/improve access to the right infrastructure, water, equipment including PPE, supplies and an environment that is designed and planned to facilitate safe and effective cleaning, including dedicated budget</li> <li>▪ Provide SOPs/illustrative procedures for use at the frontline including schedules and responsible staff</li> </ul>
Training and education – teach it <i>(to improve health worker knowledge)</i>	<ul style="list-style-type: none"> <li>▪ Put in place/maintain a program of routine, practical training and education (on job training and coaching, mentorship, orientation etc) and periodic retraining for all cleaning staff undertaking cleaning and disinfection procedures that is in line with guideline content</li> <li>▪ Allocate responsibility to check that training needs are met and that training is up to date</li> </ul>
Monitoring and feedback – check it <i>(to assess the problem, drive appropriate change and document practice improvement)</i>	<ul style="list-style-type: none"> <li>• Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities)</li> <li>• Develop/maintain a facility cleaning monitoring program which provides feedback, perform and report on staff knowledge and behaviours and checks on awareness raising materials for wear and tear.</li> </ul>
Reminders and communication – sell it <i>(to promote the desired actions, at the right time, including campaigns)</i>	<ul style="list-style-type: none"> <li>▪ Prompt cleaning actions through the use of different awareness raising materials (e.g., use of checklists or job aides on cleaning carts). Put in place a system to replace these regularly</li> </ul>
Culture and change – live it <i>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</i>	<ul style="list-style-type: none"> <li>▪ Managers and leaders at every level of the HCF show their visible support for a clean environment to help develop and reinforce a culture of patient and staff safety</li> <li>▪ A program of regular supervision and feedback is in place to support quality improvement and learning (i.e. embedding WASH FIT)</li> </ul>

## Chapter 3.4: Safe handling of linen and laundry

### Relevant international and national guidance and tools

- Essential environmental health standards in health care  
[https://apps.who.int/iris/bitstream/handle/10665/43767/9789241547239\\_eng.pdf?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/43767/9789241547239_eng.pdf?sequence=1)
- The CDC/ICAN Best Practices for Environmental Cleaning in Healthcare Facilities: in Resource-Limited Settings  
<https://www.cdc.gov/hai/pdfs/resource-limited/environmental-cleaning-RLS-H.pdf>

### Key practice points:

- Place soiled linen in appropriate bags at the point of generation and wash with soap and water, rinse and dry in a covered, dedicated place.
- Clean and soiled linen are transported and stored separately, in different (marked) bags/containers.

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

### Introduction - why we perform safe handling of linen

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

Note
<ul style="list-style-type: none"> <li>• There is no evidence that linen used by patients who are under isolation precautions carries any greater microbial load or risk of disease transmission than patients who are not in isolation.</li> </ul>



### How and when to perform safe handling of linen

#### Removal:

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

#### Collection/transport:

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

#### Laundering:

- Every healthcare facility should have a dedicated laundry area
- Once the soiled linen arrives in the laundry, the individuals handling it must wear PPE and clean their hands upon removal of PPE. Generally, staff in the laundry are required to wear household or heavy-duty gloves, a gown and/or apron and facial protection. Soiled linen should always be handled carefully, never shaking it.



- Carefully remove it from the bag or container onto the sorting table, watching for possible sharp objects or heavily soiled items.
- Sorting of dirty linen should be done separate from clean linen areas with limited traffic. Work surfaces are at or above the waist height. The sorting area needs to be equipped with disposable gloves, sink, soap and towels. The area should contain sharps containers.
- A washing machine is preferred for cleaning used linen over hand laundering. It is always important to follow instructions from the washer/dryer manufacturer.

Otherwise, best practices include:

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

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

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

### Additional considerations for linen & laundry management

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

**Table 29: Safe handling of linen and laundry using a multimodal strategy**

<p>System change – build it <i>(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</i></p>	<ul style="list-style-type: none"> <li>▪ Put in place/improve access to the right equipment including PPE and for hand hygiene, supplies and an environment that is designed and planned to facilitate safe handling of used linen for patient and health worker safety, including a dedicated budget.</li> <li>▪ Provide SOPs for linen management including roles and responsibilities.</li> </ul>
<p>Training and education – teach it <i>(to improve health worker knowledge)</i></p>	<ul style="list-style-type: none"> <li>▪ Provide a program of routine training and education and periodic retraining for all personnel involved in the collection, transport, sorting, and washing of soiled linen that is in line with guideline recommendations.</li> <li>▪ Allocate responsibility to check that training needs are met and that training is up to date.</li> </ul>
<p>Monitoring and feedback – check it <i>(to assess the problem, drive appropriate change and document practice improvement)</i></p>	<ul style="list-style-type: none"> <li>• Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) related to linen management including staff knowledge and practices.</li> </ul>
<p>Reminders and communication – sell it <i>(to promote the desired actions, at the right time, including campaigns)</i></p>	<ul style="list-style-type: none"> <li>• Prompt and remind workers about safe linen management, e.g., through illustrative guides as well as the correct PPE use. Prompts, e.g., posters, should be well placed, checked and replaced regularly.</li> </ul>
<p>Culture and change – live it <i>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</i></p>	<ul style="list-style-type: none"> <li>▪ Managers and leaders at every level of the HCF show their visible support for linen management to help develop and reinforce a culture of patient safety.</li> <li>▪ A program of regular supervision and feedback is in place.</li> </ul>

## Chapter 3.5: Respiratory hygiene and cough etiquette

### Relevant international and national guidance and tools

WHO infographic – protect others from getting sick [https://www.who.int/images/default-source/health-topics/coronavirus/risk-communications/general-public/protect-yourself/blue-3.png?sfvrsn=b1ef6d45\\_2](https://www.who.int/images/default-source/health-topics/coronavirus/risk-communications/general-public/protect-yourself/blue-3.png?sfvrsn=b1ef6d45_2)

### Key practice points

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

## Introduction - why do we perform respiratory hygiene and cough etiquette

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

## When and how to perform respiratory hygiene and cough etiquette

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

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

## Considerations for respiratory hygiene in facilities with limited resources

- If masks are being offered but supply is limited, local production is possible as a temporary solution. A system should be in place for a local authority to assess any proposed production according to specific minimum standards and technical specifications (see also chapter 3.1, hand hygiene, with regards to local production).

## Additional considerations

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

**Table 30: Improving respiratory hygiene and cough etiquette using a multimodal strategy**

System change – build it <i>(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</i>	<ul style="list-style-type: none"> <li>▪ Put in place/improve systems to reliably procure, distribute and manage disposable tissues, medical masks, alcohol based hand rub (ABHR), soap and towels, environmental cleaning and waste disposal (functional collection containers) products, including a dedicated budget.</li> <li>▪ Provide SOPs for respiratory hygiene at the health care facility, including safe use and replacement of mask and tissue supplies, cough etiquette and associated hand hygiene, cleaning and waste disposal actions.</li> </ul>
Training and education – teach it <i>(to improve health worker knowledge)</i>	<ul style="list-style-type: none"> <li>▪ Provide practical, regular training to HCWs, patients, caregivers and visitors.</li> </ul>
Monitoring and feedback – check it <i>(to assess the problem, drive appropriate change and document practice improvement)</i>	<ul style="list-style-type: none"> <li>• Put in place/improve regular IPC assessments by IPC focal person and other associated supporting IPC personnel, including monitoring, reporting and feedback mechanism (including roles and responsibilities) related to compliance with respiratory hygiene recommendations.</li> </ul>
Reminders and communication – sell it <i>(to promote the desired actions, at the right time, including campaigns)</i>	<ul style="list-style-type: none"> <li>▪ Prompt and remind HCWs, patients, caregivers and visitors about the importance of respiratory hygiene by using well placed, accurate reminders which are checked and replaced regularly.</li> </ul>
Culture and change – live it <i>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</i>	<ul style="list-style-type: none"> <li>• Create an environment that facilitates and role models respiratory hygiene.</li> </ul>

## Chapter 3.6: Health care waste management

### Relevant international and national guidance and tools

- Safe management of wastes from health-care activities [https://www.who.int/water\\_sanitation\\_health/publications/wastemanag/en/](https://www.who.int/water_sanitation_health/publications/wastemanag/en/)
- WHO Standard Precautions, waste management e-learning module <https://ipc.ghelearning.org/>

### Key practice points:

- Place waste generated in health care environments in appropriate receptacles, at the point of generation immediately after use.
- Segregate health care waste to lower risks and costs, and ensure timely, safe collection
- Perform safe collection, transportation and final disposal by incineration.
- Apply recommended modifications to final waste disposal until the correct standard of infrastructures are in place in resource constrained settings and ensure these measures fully protect the public.
- Focus on a combination of a supportive infrastructure, the use of reminders (e.g., posters), training and education (consistent with guideline content), monitoring and evaluation and a safety culture, to make it more likely that safe health care waste management will be performed in the right way at the right time.
- Provide staff with the necessary PPE and hand hygiene products to safely manage healthcare waste.

### Introduction - why do we need to manage healthcare waste safely?

- Between 75% and 90% of waste generated within a healthcare environment is non-hazardous (i.e., does not pose a risk to health) and is comparable to domestic waste (i.e., waste produced at home). Non-hazardous waste may include waste generated from the kitchen, administrative areas, and the majority of waste generated by housekeeping.
- Hazardous waste, however, is waste that is considered infectious, sharps, pathological, chemical, pharmaceutical and radioactive waste, is also generated and pose a risk to health workers and others if not managed appropriately.
- Many different health workers will be involved in handling health care waste at varying quantities, depending upon services provided and the patient load, which are generated every day.
- Health risks can result from both inappropriate handling and disposal. Risks include physical injury due to e.g., mishandling of sharps, and risk of infection due to waste contaminated with blood and body fluids, etc containing potentially harmful microorganisms. Infectious waste exposure can result in a healthcare-associated infection.
- To be safe, the waste management process generally therefore includes the following; segregation, collection, transport, storage treatment and final disposal. Safe handling of waste is inherent in all of these steps in order to protect health workers and patients/others in the health care environment, as well as those in the community.

### When to take steps to safely manage health care waste

In most clinical settings within health care environments, three categories of waste will exist. Dispose of waste into the appropriate waste container as it is produced, as close to the point of use as possible. Segregation of waste immediately after it has been used should be as; general (non-hazardous) waste, infectious waste or sharps waste. Segregation lowers risks and the cost of treatment and disposal of healthcare waste.

Collection and removal of waste receptacles should take place as follows:

- When waste bins/containers are  $\frac{3}{4}$  full or at least once daily – never dispose of waste into an already full container
- When sharps waste containers are filled to the line or  $\frac{3}{4}$  full
- Hazardous and non-hazardous waste should not be collected for removal at the same time (or mixed during collection), manually separating waste should never be done. A waste bag/container should only be collected when it has been properly sealed and tagged according to local policy
- Waste should then be treated and finally disposed of, as storage should not exceed the following periods:

## How to safely manage health care waste

### How to minimize waste generation

Minimizing waste may not be practical for health care facilities (e.g., the purchasing reusable equipment but unable to safely reprocess). Where feasible, measures to minimize healthcare waste include:

- Selecting materials with limited packaging
- Choosing equipment that can be reprocessed locally (appropriately cleaned, disinfected, and reprocessed in a facility)
- Changing products, for example, changing from toxic (e.g., glutaraldehyde) to less toxic (e.g., ortho-phthalaldehyde) disinfectants.

### How to safely dispose of and segregate waste

- Employ, at a minimum, a 3-bin system:
  - General healthcare waste, normally a black lined container.
  - Other (non-sharps) infectious waste, normally a lined yellow container. This includes waste contaminated with body fluids (dressings, bandages, swabs, gloves, masks, etc), cultures and stocks of infectious agents from laboratory work, waste from patients being cared for in isolation due to suspected or proved infection.
  - Sharps waste, into a dedicated sharps container.
- Use PPE based on a risk assessment of the task to be carried out – the risk of exposure to body fluids
- Deposit (non-sharps) infectious waste in a container that is:
  - Leak proof and puncture-resistant
  - Covered with a lid
  - Labelled with type of waste and, if possible, colour coded
  - Preferably lined with a (coloured) plastic bag
- Do not overfill containers/bags—they should be no more than  $\frac{3}{4}$  full to enable bag closure and safe transport.
- Deposit sharps in a container that is puncture-resistant and labelled
- Place sharps containers within arm's reach of where sharps are used (e.g., bedside).
- Ensure sharps containers are secured e.g., secured to a cart or secured to the wall.
- Do not overfill sharps containers.
- Do not empty sharps and then reuse the container (sharps containers should be single-use).

In addition to the 3-bin system, facilities may need specific segregation and waste categories for toxic waste and radioactive waste (i.e., 5 waste categories instead of 3). Services offered at the facility provide the rationale for waste segregation practices. For example, facilities that perform deliveries need a specific waste bin for placentas (i.e., pathological waste) or who have the need to dispose of pharmaceutical or chemical.

### **How to collect waste**

- Use PPE when handling hazardous waste. Appropriate PPE for waste handling includes:
  - Heavy duty gloves (not nitrile/latex gloves)
  - Preferably a long fluid resistant sleeved gown (and/or an apron depending on the circumstances)
  - Boots or closed toed shoes
  - Mask/goggles or face shield (if indicated due to expected splashes, etc)
- Tie bags securely and ensure they are labelled
- Do not shake or squeeze bags in an attempt to reduce volume when sealing them.
- Carry sealed bags at the top (i.e., by their neck) and away from your body.
- Do not lift or hold bags by the bottom or sides.
- Ensure that bags are not broken or split, (carefully place them into another bag).
- Do not throw bags and avoid dropping them.
- Keep general waste separated from hazardous waste.
- As soon as waste has been removed, waste bins/containers should be cleaned before a new bag liner is placed in the container.
- Remove PPE and perform hand hygiene immediately after handling waste.

### **How to transport waste**

- Keep hazardous and non-hazardous waste separate (yellow - black).
- Transport waste with covered trolley, wheel barrow, wheeled bin or cart.
- Transport equipment should:
  - be dedicated for waste transportation only and labelled as such
  - not have sharp edges that might tear bags or damage containers
  - be easy to load and unload
  - be easy to clean and cleaned and disinfected at the end of each working day, PPE should be worn, and hand hygiene performed afterwards.

### **How to store waste**

- Dedicate the right size of storage areas according to the quantities / volume of waste generated and the frequency of collection.
- Storage areas should:
  - be fenced and paved
  - have easy access for municipal waste collection trucks.
- Where recycling takes place, separate areas for recyclables should be available.
- Only infectious and sharp waste should be stored in that dedicated storage area – there should be no mixing with other waste. The area should be marked with biohazard symbol and the floor and walls should be sealed or tiled to allow easy disinfection. It should also be well ventilated & protected from rain.
- All storage areas should be inaccessible to unauthorized persons, animals, insects and birds.

### **How to finally treat and dispose of waste generated in health care**

While general non-hazardous healthcare waste can be disposed of without treatment (i.e., through municipal waste), hazardous waste is treated prior to final disposal. Health care facilities should conduct a risk assessment based on the type of waste, quantity, and access to resources and choose the methods that will pose the least risk to public health and the environment.

Technologies in accordance with international conventions are low heat-based and chemical-based processes and dual chamber incineration with flue gas treatment. Interim treatment technologies are dual chamber incineration with flue gas treatment, single chamber incineration without flue gas treatment and automated pressure pulsing gravity autoclaving. Incinerators should be placed away from healthcare buildings, residential areas, or where food is grown.

## Incineration

Treatment systems should comply with Stockholm Convention. Low cost and easy to install, their features are as follows:

- two burning chambers (1<sup>st</sup>: 850 °C and 2<sup>nd</sup>: 1,100°C),
- auxiliary burners
- sufficient resident time of air in the 2<sup>nd</sup> chamber
- sufficient oxygen content and,
- high turbulence of exhaust gases,
- as well as flue gas treatment.

Additionally:

- Provide sufficient budget for a safe and environmental-friendly operation (e.g., sufficient fuel, maintenance, and repair of the incinerator).
- Train operators to safely and effectively operate the incinerator; provide regular refresher training. Ensure that PPE used is not a flammable injury hazard (e.g., gloves).
- Comply with national emission control regulations.

## Steam treatment technology - autoclaving

The type of autoclaves for waste treatment are:

- gravity-displacement autoclaves (has the advantage)
- pre-vacuum or high-vacuum autoclaves
- pressure pulse autoclaves.

Integrated steam-based treatment systems also exist.

Other types of final waste treatment are available including microwave treatment technologies, dry heat treatment technologies, chemical treatment technologies, internal shredding, chemical disinfectant (noting microbial resistance has been encountered) and alkaline hydrolysis.

An ash pit, if it should be used, should be lined with watertight bricks or concrete lining to prevent contamination to the soil and water. Ash is considered as hazardous waste and should be disposed of in engineered landfills, encapsulated and buried, or disposed of in a concrete-lined ash pit. Avoid direct contact and inhalation, and wear appropriate PPE (e.g., utility gloves, plastic apron, goggles, and mask or N95 respirator). A sanitary landfill pit should use a clay liner to isolate waste from the environment.

**Infectious (Non-Sharps) and sharps waste** should be incinerated. They can also be autoclaved following typical operation steps, or other treatment options taken depending on availability of resources. Importantly, the steps for final treatment whatever system is used should be carefully followed. Sharps that are autoclaved should then be buried, e.g., in special landfill trenches.

The following types of waste **should not be incinerated**; pressurized gas containers, sealed ampules or vials, chemical waste, halogenated materials, waste containing mercury, cadmium and other heavy metals, radioactive waste.

**Pharmaceutical Waste** – before treatment it should be labelled and sorted according to dosage form or by active ingredient, depending the treatment option available.

Small quantities can be returned to the donor or manufacturer, encapsulated and buried in sanitary landfill, chemically decomposed according to manufacturers' instruction (if resource and expertise is available), diluted into large amounts of water and discharged into the sewer (only moderate quantities of mild liquids, e.g., solutions containing vitamins, cough syrups, intravenous solutions.

Antibiotics or cytotoxic drugs should not be discharged into municipal sewers or watercourses.

Large quantities of pharmaceutical waste may be disposed of by the following methods:

- encapsulation and burial in a sanitary landfill;
- incineration in kilns equipped with pollution-control devices designed for industrial waste and that operate at high temperatures;
- dilution and sewer discharge for relatively harmless liquids such as intravenous fluids (salts, amino acids, glucose).

Cytotoxic waste and be returned to the supplier, incinerated at high temperatures or be chemically degraded in accordance with manufacturers' instructions.

**Heavy Metals** - A waste management plan should include waste minimization by limiting the quantities of heavy metals used. Examples of waste with heavy metal content include batteries that contain cadmium, thermometers, and blood pressure machines containing mercury.

Disposal options for small amounts of heavy metal waste at healthcare facilities include returning to the supplier. Treatment and disposal of radioactive waste is generally under the jurisdiction of a nuclear regulatory agency.

**Non-Recyclable Aerosol Containers** - Before aerosol containers are buried, any residual pressure should be released. Containers can also be returned to the manufacturer.

**Chemical waste** - It is not possible to dispose both safely and cheaply of large quantities of hazardous chemical waste without using sophisticated treatment methods. The appropriate means of storage and disposal is dictated by the nature of the hazard presented by the waste. Improving chemical waste management starts with waste minimization. The following steps apply:

- Hazardous chemical wastes of different composition should be stored separately to avoid unwanted chemical reactions.
- Aim to return them to the supplier.
- Hazardous chemical waste should not be discharged into sewerage systems.
- Large amounts of chemical waste should not be buried, because they may leak from their containers, overwhelm the natural attenuation process provided by the surrounding waste and soils, and contaminate water sources.
- Large amounts of chemical disinfectants should not be encapsulated, because they are corrosive to concrete and sometimes produce flammable gases.

### Considerations for health care waste management in facilities with limited resources

- While a definition of infectious waste exists, IPC staff should determine whether types of health care waste from patients in non-isolation wards should be classified as infectious waste, to streamline waste disposal to suit local treatment needs until services improve.
- If there is a lack of ready-made, purchased sharp containers, locally made containers are an option. They should be made of a material that does not allow sharps to come through, e.g., sturdy plastic or cardboard. Labels should be produced locally which explains use, include a  $\frac{3}{4}$  fill line and have a hazard symbol.
- Several non-burn methods have been developed in some LMICs for sharps waste, in response to concerns about air pollution and the short lifespan of brick incinerators. The methods generally entail the following steps:
  - using onsite mechanical needle cutters or electric needle destroyers
  - shredding the treated plastic parts
  - burying the metal pieces in sharps pits
  - re-melting the plastics for recycling



- Sharps pits on the healthcare facility premises should be concrete lined or encapsulated by mixing waste with immobilizing material like cement before disposal. These procedures are only recommended in cases where the waste is handled manually and the landfill for general waste is not secured. If the outlined treatment options are not available, small quantities of sharps waste can be buried/encapsulated directly into designed sharps pits.
- An alternative final disposal for hazardous waste is a protected onsite burial pit at the healthcare facility (interim, short term solution). Importantly, the waste should never be accessible to unauthorized persons (fenced and locked) and should be isolated from the surrounding environment (groundwater, air, rain). This isolation is accomplished with a bottom liner and daily covering of soil. Safe onsite burial is practical for only limited periods of time (1–2 years) and for relatively small quantities of waste. Burial can be used as a method of waste disposal only where the water table is more than 4 m (12 feet) below the surface. During this interval, the healthcare facility should continue to look for better, permanent methods for waste disposal.
- The treatment of anatomical, pathological, and placenta and foetal remains wastes may be bound by sociocultural, religious and aesthetic norms and practices and may require special burial sites. The site for a placenta pit should minimize public accessibility and the size will depend upon the number of daily child births in a facility. On average, one placenta and associated fluids require 5 litres (1.5 gallons) of pit capacity. Natural degradation and draining of liquid into the subsoil greatly reduces the volume of waste in the pit and facilitates the inactivation of pathogens. Small quantities of anatomical waste (e.g., body parts) may also be disposed of in placenta pits, if other treatment options are not available or if sociocultural or religious norms prohibit other forms of treatment. The pit should be designed to prevent the waste from contaminating the surrounding groundwater. A distance of at least 1.5 m from the bottom of the pit to the groundwater level is recommended. Placenta pits are not recommended in sites where the water table is near the surface or in areas prone to flooding.
- A burning pit is not recommended and should only be used for disposal of waste during emergencies in the absence of other options. They cause higher smoke pollution and other health risks.
- Again, if there is no other option, encapsulation can be undertaken by adding immobilizing materials (i.e., cement, foam, clay material) and sealing containers, e.g., metal drums  $\frac{3}{4}$  filled with sharps or chemical or pharmaceutical residues which are then placed in landfill sites. Inertization is a variant of encapsulation and is appropriate for pharmaceutical waste. It involves removing the packaging materials, paper, cardboard and plastic and then the pharmaceuticals can be ground, and a mix of water, cement and lime added to form a homogenous paste. They can then be transported to a suitable storage site. Information is also available on how to transport the homogenous mixture into liquid state to be suitable for landfill municipal waste.
- Liquid infectious waste includes liquid culture media, blood, body fluids, human excreta, and rinsing liquids from operating rooms. Similar to pathological waste, incineration technologies typically available may not be effective for large quantities of liquids. Liquid infectious waste can be disinfected. In emergency situations, it can be disposed of directly into a closed sewer system (e.g., utility sink drain, flushable toilet) or on-site septic tank system if staff wear PPE and take precautions to avoid splashing. If neither is available, this waste should be poured directly into a pit latrine. Disposing of liquid infectious waste into pipes that go to open drainage canals should not be conducted without pre-treatment. The sink, toilet, etc., used for disposal of liquid infectious waste should be thoroughly rinsed with water, cleaned and disinfected (e.g., using 0.5 % chlorine solution) to remove residual waste.
- **Note: Liquid Waste from Highly Infectious Diseases**
  - Disposal of liquid waste (e.g., blood, faeces, vomit) from highly infectious diseases with very high mortality rates, such as cholera and Ebola virus disease, requires more caution than other infectious liquid waste.
  - Pre-treatment should be conducted using a thermal method, such as steam sterilization, or lime milk (calcium oxide). Note that chlorine-based solutions are not effective in disinfecting liquid waste with large quantities of organic material (e.g., blood, faeces, vomit).

## Additional considerations

- When working, cover cuts and abrasions with a waterproof dressing.
- Perform hand hygiene after handling of any waste, immediately after PPE is removed.
- Any incident where inappropriate waste disposal or injury as a result of handling waste has occurred should be reported to the In-Charge and/or other relevant member of staff in line with local incident reporting procedures.
- Waste handlers should be offered vaccinations.
- The following documentation should be available:
  - Standard Operation Procedures (SOPs) / Protocols (e.g., for segregation, collection, transport, storage, treatment, disposal, spillages) including possible hazards and responsible persons/emergency contact.
  - Incident reports (sharp incidents etc.).
  - Daily collection forms including details of the weighing records of the generated infectious and sharp waste.

**Table 31: Improving healthcare waste management through a multimodal strategy**

System change – build it <i>(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</i>	<ul style="list-style-type: none"> <li>• Put in place/improve services to achieve optimum waste management systems, including incineration. This will require budget           <ul style="list-style-type: none"> <li>▪ Put in place/improve a mechanism to ensure sharps waste containers are easily accessible at the point of use</li> <li>▪ Make available functional waste disposal containers for infectious and non-infectious water (bins with plastic bag liner).</li> <li>▪ Put in place an up-to-date policy/standard operating procedure that is targeted at local actions including how access to products can be assured.</li> </ul> </li> </ul>
Training and education – teach it <i>(to improve health worker knowledge)</i>	<ul style="list-style-type: none"> <li>▪ Put in place the provision of regular (at least annual) training for all HCWs and waste handlers.</li> <li>▪ Allocate responsibility to check that current training and education programmes include the correct recommendations - map guideline recommendations to training content.</li> <li>▪ Identify the expertise required to conduct training.</li> </ul>
Monitoring and feedback – check it <i>(to assess the problem, drive appropriate change and document practice improvement)</i>	<ul style="list-style-type: none"> <li>• Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) on waste management including:           <ul style="list-style-type: none"> <li>○ direct observation of HCWs and waste handlers</li> <li>○ indirect methods (e.g. observation of waste bags within transport equipment and in storage areas)</li> <li>○ availability of waste disposal units at the point of use, as well as reminders in those areas (e.g. posters).</li> </ul> </li> </ul>
Reminders and communication – sell it <i>(to promote the desired actions, at the right time, including campaigns)</i>	<ul style="list-style-type: none"> <li>▪ Prompt and remind HCWs about the importance of safe segregation of waste in health care areas. Prompt and remind waste handlers about safe practices.</li> </ul>
Culture and change – live it <i>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</i>	<ul style="list-style-type: none"> <li>• Create an environment and the perceptions that facilitate awareness-raising about patient and health worker safety issues while guaranteeing commitment to all components of health care waste management as a high priority at all levels.</li> </ul>

## Chapter 3.7: Prevention of sharps injuries

### Relevant international and national guidance and tools

- WHO guideline on the use of safety-engineered syringes for intramuscular, intradermal and subcutaneous injections in health care settings <https://apps.who.int/iris/handle/10665/250144>
- Safety of injections: WHO-UNICEF-UNFPA joint statement on the use of auto-disable syringes in immunization services, 2nd rev <https://apps.who.int/iris/handle/10665/63650>
- WHO guidelines on drawing blood: best practices in phlebotomy [https://www.who.int/infection-prevention/publications/drawing\\_blood\\_best/en/](https://www.who.int/infection-prevention/publications/drawing_blood_best/en/)
- WHO best practices for injections and related procedures toolkit [https://www.who.int/infection-prevention/publications/best-practices\\_toolkit/en/](https://www.who.int/infection-prevention/publications/best-practices_toolkit/en/)
- WHO Standard Precautions, injection safety e-learning module <https://ipc.qhelearning.org/>

### Key practice points:

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

### Introduction - why we perform injection and phlebotomy safety and sharps injury prevention

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

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

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

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


Clean work space:

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

Administration:

- Gloves are not required for routine intradermal, subcutaneous or intramuscular injections if your skin is intact or the patient's skin is intact.
  - Gloves should be used **ONLY** when indicated.
- See Table 16 for indications and precautions with respect to appropriate glove use

**Table 32: Indications for glove use in injection practice**

Key elements	Indications	Precautions
Glove use 	Wear non-sterile, well-fitting, single-use gloves: <ul style="list-style-type: none"> <li>• When contact with a patient's blood or other potentially infectious materials (e.g., body fluids, moist body substances and saliva [in dental procedures]), mucous membranes and non-intact skin is anticipated.</li> <li>• During venepuncture or venous access injections, due to the potential for blood exposure at puncture site.</li> <li>• If HCW's skin is NOT intact (e.g., through eczema, cracked or dry skin).</li> <li>• If patient's skin is NOT intact (e.g., through eczema, burns or skin infections).</li> </ul>	When undertaking injections: <ul style="list-style-type: none"> <li>• <b>DO NOT</b> use gloves for routine intradermal, subcutaneous, or intramuscular injections if your skin is intact OR if the patient's skin is intact.</li> <li>• <b>DO NOT</b> use the same pair of gloves for more than one patient</li> <li>• <b>DO NOT</b> wash gloves for reuse</li> <li>• Gloves <b>DO NOT</b> provide protection against needle-stick or other puncture wounds caused by sharp objects.</li> <li>• Needles, scalpels, and other sharps should be handled with extreme caution</li> </ul>

- Always use sterile injection equipment.
- Always use a new syringe and a needle opened from a new packet
  - Be sure to visually inspect the packaging for any visible damage, moisture or any indication of possible contamination or error.
  - Discard the device if the package has been punctured, torn, or damaged or if the expiry date has passed.
  - Hand hygiene must always be performed before preparing injection material, before giving an injection and after giving an injection.
- If the injection site is visibly dirty/soiled, wash with soap and water
- Skin disinfection may be required. When indicated, be sure to:
  - Use a 60–70% alcohol-based solution on a cotton wool ball or single-use swab
  - wipe from the centre working outwards, avoiding the same area
  - allow to dry for 30 seconds.
- For culture or donation, disinfect with 2% chlorhexidine (CHX) in 70% alcohol
  - For children of age 2 months or less: use alcohol alone.
- See table 17 below for a summary of skin preparation for different types of injection.

**Table 33: Skin preparation for different types of injection**

Type of injection	Soap and water	60–70% alcohol (Isopropyl alcohol or ethanol)
Subcutaneous	Yes	No
Intramuscular	Yes <sup>a</sup>	Yes <sup>a</sup>
Immunization	Yes	No
Venous access	No	Yes

<sup>a</sup> Unresolved issue because there is a lack of evidence on the need to disinfect the skin before intramuscular injections.

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

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

### **Sterile medication vials and diluents**

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

### Appropriate collection of sharps:

- After giving an injection, do not attempt to recap the needle; place the syringe and the needle in the sharps container.
  - If a needle must be re-capped, see image 1 on performing the 'scoop method'.

Image 1. Scoop method



1. Place cap on hard flat surface

2. Scoop cap up with end of needle so that the cap is sitting on needle

3. Press cap and needle on hard flat surface until cap snaps into place

- Sharps containers should be:
  - sufficient in number so as to be available “*within arm’s reach*” in all situations where sharps are generated.
  - puncture-resistant, leak-proof, and sealable when 3/4 full.
- For safe and final disposal of sharps, see Chapter 3.6 on waste management.

### Considerations in facilities with limited resources

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

### Additional considerations

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

**Table 34: Approaching injection and phlebotomy safety and sharps injury prevention using a multimodal strategy**

<p>System change – build it <i>(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</i></p>	<ul style="list-style-type: none"> <li>▪ Put in place and maintain access to the right equipment including syringes, needles, PPE, hand hygiene supplies and an environment that facilitates safe injections, phlebotomy and handling of sharps for patient and HCW safety – including receiving adequate prophylactic vaccinations for HCWs. This requires a dedicated budget.</li> <li>▪ Provide SOPs outlining roles and responsibilities</li> </ul>
<p>Training and education – teach it <i>(to improve health worker knowledge)</i></p>	<ul style="list-style-type: none"> <li>▪ Provide a reliable program of routine training and education and periodic retraining for all HCWs responsible for handling and disposing of sharps that is in line with guideline recommendations.</li> <li>▪ Allocate responsibility to check that training needs are met and that training is up to date.</li> </ul>
<p>Monitoring and feedback – check it <i>(to assess the problem, drive appropriate change and document practice improvement)</i></p>	<ul style="list-style-type: none"> <li>• Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) on compliance with sharps management including staff knowledge and practices.</li> </ul>
<p>Reminders and communication – sell it <i>(to promote the desired actions, at the right time, including campaigns)</i></p>	<ul style="list-style-type: none"> <li>▪ Prompt and remind staff about sharps prevention use by using accurate, well placed, reminders which are checked and replaced regularly.</li> </ul>
<p>Culture and change – live it <i>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</i></p>	<ul style="list-style-type: none"> <li>• Managers and leaders at every level of the HCF show their visible support for injection and phlebotomy safety and sharps injury prevention and reinforce a culture of patient safety.</li> <li>• A program of regular supervision and feedback is in place.</li> </ul>

## Chapter 4: Transmission-based precautions (TBPs)

### Relevant international and national guidance and tools

- WHO Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level <https://www.who.int/infection-prevention/publications/ipc-components-guidelines/en/>
- WHO Minimum Requirements for infection prevention and control (IPC) programmes <https://www.who.int/infection-prevention/publications/min-req-IPC-manual/en/>
- WHO Infection prevention and control during health care when coronavirus disease (COVID-19) is suspected or confirmed. Interim guidance <https://www.who.int/publications/i/item/WHO-2019-nCoV-IPC-2020.4>
- WHO Rational use of personal protective equipment for coronavirus disease (COVID-19) and considerations during severe shortages [https://www.who.int/publications/i/item/rational-use-of-personal-protective-equipment-for-coronavirus-disease-\(covid-19\)-and-considerations-during-severe-shortages](https://www.who.int/publications/i/item/rational-use-of-personal-protective-equipment-for-coronavirus-disease-(covid-19)-and-considerations-during-severe-shortages)
- WHO IPC training module, Transmission Based Precautions e-learning <https://ipc.ghelearning.org/>
- CDC (2007) Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. Last updated July 2019 <https://www.cdc.gov/infectioncontrol/pdf/guidelines/isolation-guidelines-H.pdf>
- WHO Guidelines on Natural Ventilation for Infection Control in Health-Care Settings [https://apps.who.int/iris/bitstream/handle/10665/44167/9789241547857\\_eng.pdf?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/44167/9789241547857_eng.pdf?sequence=1)
- The CDC/ICAN Best Practices for Environmental Cleaning in Healthcare Facilities: in Resource-Limited Settings <https://www.cdc.gov/hai/pdfs/resource-limited/environmental-cleaning-RLS-H.pdf>

## Chapter 4.1 Contact, droplet and airborne precautions

### Key practice points:

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

### Introduction - why TBPs are needed?

- Standard Precautions are applied to the care of all patients in all healthcare settings, regardless of the suspected or confirmed presence of an infectious agent. Refer to chapter 3, Standard Precautions.
- TBPs are additional measures for patients who are known or suspected to be infected or colonized with infectious agents, including certain epidemiologically important pathogens, which require additional control measures to effectively prevent transmission. They are grouped into categories according to how the infection is spread (i.e., the mode of transmission of the infectious agent), the three categories are: i) Contact, ii) Droplet and iii) Airborne.



- They are based on suspected (i.e., according to signs and symptoms) or differential diagnosis of known (diagnosis or lab confirmed) infection or colonization.
- For some diseases that have multiple routes of transmission (e.g., SARS), more than one TBPs category may be used.

### When and how to apply TBPs?

- TBPs should be applied when caring for patients with known infection, patients who are colonized with an infectious organism, and asymptomatic patients who are suspected of/under investigation for colonization or infection with an infectious microorganism.
- The three categories of TBPs each have their own specific recommendations. See: Tables Contact Precautions, Droplet Precautions and Airborne Precautions at the end of this chapter for these recommendations. However, there are some general considerations common to all including: patient identification and triage and the use of signage.
- **Patient identification – the importance of timely effective triage**
  - Refer to chapter 8: Screening, triage and isolation: actions to support outbreak management and preparedness and the chapter 3.2, PPE
  - Clinical triage is used to identify whether patients might need to be placed on TBPs and should occur: when a patient first arrives at a healthcare facility and whenever a patient develops new signs or symptoms during hospitalization.
  - There should be designated isolation space and a plan for reporting to public health authorities.
  - TBPs should be implemented immediately if triage identifies that a patient has a suspected or known infection that cannot be stopped by Standard Precautions alone.
  - If available, conduct laboratory testing to confirm the microorganism responsible for infection.
  - The individual responsible should refer to annexe 12 (Clinical Syndromes/Conditions Warranting Empiric TBPs in addition to Standard Precautions) and Table 19 (Summary of IPC precautions for Standard, Contact, Droplet and airborne transmission) during triage to help determine the precautions to be employed.

**Table 35: Summary of IPC precautions for standard, contact, droplet and airborne Transmission**

Activity	STANDARD PRECAUTIONS	CONTACT TRANSMISSION	DROPLET TRANSMISSION	AIRBORNE TRANSMISSION
<b>Triage and patient placement</b>	Single room not required	Single room and minimize time outside	Single room. Minimize time outside the isolation room, and when the patient should wear surgical mask. Provide at least 1 metre (>3 feet) of separation between patients in the cohort if possible	Single well-ventilated room (ideally with negative pressure ventilation). Minimize time outside isolation room and patient may wear surgical mask. Exclude non-essential susceptible people
<b>Hand hygiene according to Five Moments</b>	Yes	Yes	Yes	Yes
<b>Gloves</b>	When likely to touch blood, body fluids and contaminated items	Wear gloves on entering room to provide patient care (i.e., when contact/touching is likely with patient and their blood, body fluids and contaminated items and equipment)	Use risk assessment judgment as per <i>Standard Precautions</i>	Use risk assessment judgment as per <i>Standard Precautions</i>
<b>Apron/gown</b>	If soiling likely i.e., during procedures likely to generate contamination from blood and body fluids	Wear it on entering room if clothing will have substantial contact with the patient, environmental surfaces or items in the patient's room	Use risk assessment judgment as per <i>Standard Precautions</i>	Use risk assessment judgment as per <i>Standard Precautions</i>
<b>Mask</b>	Wear regular mask during procedures likely to generate contamination with aerosols	Use risk assessment judgement as per <i>Standard Precautions</i>	Wear fluid resistant surgical /medical mask on entering patient room/cubicle N.B. in areas of community COVID-19 transmission HCWs to wear medical /surgical masks continuously throughout their shift in clinical areas	Wear high efficiency filtration mask (FFP3 or N95) on entering the room.
<b>Eye protection/ face shields</b>	During procedures likely to generate contamination with blood and body fluids	Use risk assessment judgement as per <i>Standard Precautions</i>	Use risk assessment judgement as per <i>Standard Precautions</i>	Use risk assessment judgement as per <i>Standard Precautions</i>

Activity	STANDARD PRECAUTIONS	CONTACT TRANSMISSION	DROPLET TRANSMISSION	AIRBORNE TRANSMISSION
<b>Equipment decontamination</b>	Yes	Yes	Yes	Yes
<b>Environment cleaning</b>	Yes	Yes	Yes	Yes
<b>Miscellaneous</b>	Avoid contaminating environmental surfaces with gloves	Remove gloves and gown, wash hands before leaving patient's room	Provide at least 1,5 metre (3 feet) of separation between patients in cohort	Advise patient to cover nose and mouth when coughing or sneezing

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

### Special note on Viral Haemorrhagic Fever

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

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

### Considerations in facilities with limited resources

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

### Additional considerations

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

**Table 36: Approaching TBPs using a multimodal strategy**

<p>System change – build it <i>(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</i></p>	<ul style="list-style-type: none"> <li>• Put in place/improve a sustainable system to reliably procure and deliver necessary supplies needed to enable: (a) compliance with hand hygiene at the ‘Five Moments’, that is, alcohol-based hand rub at the point of care, water, soap and hand drying materials; (b) compliance with recommended contact, droplet and airborne precautions, that is, PPE, with a focus on the need for a range of sizes.</li> <li>• In settings where water access/quality are not readily available, develop a plan for improving water access and quality.</li> <li>• In settings where bar soaps are used for handwashing, they should be kept dry; hand drying materials should be single use (particularly important for contact precautions).</li> <li>• Develop/adapt enforceable protocols/standard operating protocols available at the point of care on: (a) who decides about patient isolation (that is, designate nurses as decision-makers on isolation as they are 24/7 on the wards and it can be done in a more timely manner; (b) which organisms require the implementation of TBPs and isolation (see table 19) (c) criteria for ward closure, for example, outbreaks; (d) when is it acceptable to care for patients with different organisms in the same cohort and how the geographical separation should be done (that is, where there is no availability of separate rooms and influenced by local epidemiology); (e) what supplies need to be procured and distributed regularly.</li> <li>• Define and agree on roles and responsibilities for effective procurement systems with strong IPC involvement.</li> <li>• Adequate patient to staff ratio</li> <li>• Implement environmental and engineering controls (e.g., separate area for isolation or cohorting, standards for adequate ventilation according to specific areas in the facility, environmental cleaning protocols) according to type of TBP</li> </ul>
<p>Training and education – teach it <i>(to improve health worker knowledge)</i></p>	<ul style="list-style-type: none"> <li>• Assess local training needs.</li> <li>• Use Open WHO training material</li> <li>• Reinforce application of the ‘Five Moments’ for hand hygiene for patients with invasive devices</li> <li>• Ensure that senior management and hospital administrators fully understand all aspects of TBPs, including the importance of the moments for hand hygiene, the use of PPE, and the indications for instituting TBPs, triage and isolation.</li> <li>• Secure sign-off of training plans by senior managers (for example, by the IPC committee or equivalent)</li> <li>• Train staff on a regular schedule on all aspects of TBPs (focus on pre-employment/orientation and periodic updates) and enable staff to train others.</li> <li>• Develop information/educational resources using a range of media for patients and carers with a focus on the implications of infection/colonization and psychological support.             <ul style="list-style-type: none"> <li>▪ Those performing training should be competent in the subject matter.</li> </ul> </li> </ul>
<p>Monitoring and feedback – check it <i>(to assess the problem, drive appropriate change and document practice improvement)</i></p>	<ul style="list-style-type: none"> <li>• Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) regarding:             <ul style="list-style-type: none"> <li>○ reliable availability of hand hygiene infrastructures and products, for example, clinical handwash basins, soap, water, hand drying products, alcohol-based hand rub;</li> <li>○ percentage of staff compliant with standard operating procedures/protocols, for example, hand hygiene compliance</li> </ul> </li> </ul>

	<p>according to the 'Five Moments'; (b) use of TBPs, including a mechanism for reporting shortages, stockouts and failure of PPE;</p> <ul style="list-style-type: none"> <li>○ reliable availability of isolation and cohorting facilities;</li> <li>○ appropriate use of isolation and cohorting facilities;</li> <li>○ availability and use of patient and visitor information materials;</li> <li>○ correct and timely implementation of contact precautions and isolation or cohort</li> </ul> <ul style="list-style-type: none"> <li>● Ensure that monitoring, reporting and feedback mechanism address decision makers in addition to health care workers.</li> <li>● Consider the development/use of daily/weekly checklists</li> </ul>
Reminders and communication – sell it <i>(to promote the desired actions, at the right time, including campaigns)</i>	<ul style="list-style-type: none"> <li>● Raise awareness of the list of Clinical Syndromes/Conditions Warranting Empiric Transmission-Based Precautions in addition to Standard Precautions (see table 19) – encourage discussion of TBPs during handovers to reinforce key messages</li> <li>● In collaboration with staff, develop/adapt: <ul style="list-style-type: none"> <li>○ bedside identification reminders that respect the patient's rights to privacy and dignity;</li> <li>○ awareness-raising messages (for example, posters) placed appropriately to remind staff of correct practices;</li> <li>○ scripts/prompts for local champions to use when communicating on necessary IPC measures for TBPs</li> <li>○ memos (electronic/paper) to communicate rapidly and on a large scale, for example, during outbreaks;</li> <li>○ videos on the appropriate use of PPE;</li> <li>○ patient information materials (leaflets and visual resources to account for low literacy).</li> </ul> </li> <li>● Support and strengthen communications between different team members (laboratory, microbiology, IPC, clinicians).</li> </ul>
Culture and change – live it <i>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</i>	<ul style="list-style-type: none"> <li>● Encourage senior management to use relevant opportunities to explain that the facility is supportive of tackling HAI and to promote and reinforce protocols/standard operating procedures.</li> <li>● Engage senior clinicians and nurses to explain to colleagues the importance of TBPs, including triage, patient placement and patient identification</li> <li>● Identify champions to be role models for the correct use of PPE.</li> <li>● Put in place visible signage showing key leader commitment to TBPs</li> </ul>

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

**Table 37: Contact Precautions**

<b>Contact precautions</b>	
<b>Why contact precautions are needed</b>	<ul style="list-style-type: none"> <li>● Contact transmission is the most common way that microbes spread from one infected or colonized person to another, usually via direct or indirect contact e.g., when healthcare workers touch a patient's skin, their hands can become contaminated with microorganisms from that patient. If the HCW then touches another patient without performing hand hygiene, they have carried microorganisms to the second patient</li> </ul>
<b>When and how -</b>	<ul style="list-style-type: none"> <li>● Triage will identify which patients require contact precautions. Health workers should be made aware of the clinical syndromes and conditions requiring contact precautions (see table XX Clinical Syndromes/Conditions Warranting Empiric TBPs in addition to Standard Precautions)</li> </ul>

Contact precautions	
	<ul style="list-style-type: none"> <li>• Organisms or conditions that require Contact Precautions include multidrug-resistant (MDR) organisms such as MDR <i>Acinetobacter baumannii</i>, abscesses with major draining, and incontinence or severe diarrhea.</li> <li>• Contact precautions include: (1) appropriate patient placement; (2) use of personal protective equipment, including gloves and gowns; (3) limiting transport and movement of patients; (4) use of disposable or dedicated patient care equipment; and (5) prioritizing cleaning and disinfection of patient rooms</li> <li>• In some circumstances, depending on the individual risk assessment of some patients, pre-emptive isolation/cohorting and the use of contact precautions may be necessary until the results of surveillance cultures for certain organisms are available (e.g., CROs).</li> </ul>
Appropriate patient Placement – isolation and/or cohorting	<ul style="list-style-type: none"> <li>• Isolate patients who require Contact Precautions in a private/single room, if possible.</li> <li>• When single-patient rooms are in short supply or not available: <ul style="list-style-type: none"> <li>○ Prioritize single rooms for patients with conditions that may spread pathogens (e.g., faecal incontinence).</li> <li>○ If it becomes necessary to place a patient on Contact Precautions in a room with patients who are not infected or colonized with the same pathogen, avoid placing that patient in an area with immunocompromised patients, for example, pregnant patients or burn patients.</li> <li>○ Make sure that patients are physically separated (more than 1 meter/3 feet apart) from each other; if there are privacy curtains, make sure they are closed. Consider using physical barriers to prevent HCW from moving directly from a patient on Contact Precautions to one that is not.</li> <li>○ If in a shared room with a toilet, patients should avoid sharing a toilet; one patient can be offered a bedside commode or bedpan.</li> </ul> </li> <li>• Clear communication regarding a patient's colonization/infection status is important e.g., flagging the medical chart.</li> <li>• Applying contact precautions could involve potential unintended consequences for the patient (for example, patient frustration or discomfort during treatment with contact precautions). Mitigation measures should be considered.</li> </ul>

Contact precautions	
Patient Care Equipment	<ul style="list-style-type: none"> <li>Use disposable or dedicated patient-care equipment (e.g., blood pressure cuffs, stethoscopes) and reprocess (i.e., clean and disinfect) equipment before reuse on other patients.</li> </ul>
PPE (see PPE in Standard Precautions)	<ul style="list-style-type: none"> <li>See the PPE chapter for details about how to put on and remove PPE.</li> <li>Put on a clean, non-sterile gown and gloves upon entering the patient care area; remove and properly discard before exiting the patient room to contain infectious agents. Perform hand hygiene according to the 5 Moments and this includes before putting on and immediately after removing PPE.</li> <li>For semi-private or multi-patient rooms, do not use the same PPE between patients. Remove PPE, perform hand hygiene, and put on new PPE before coming in contact with another patient and or patient environment (i.e., room, bed, etc.)</li> <li>Occupational health issues associated with the use of some PPE (for example, latex gloves) should also be taken into consideration for health care workers.</li> </ul>
Transport and movement	<ul style="list-style-type: none"> <li>When transport is necessary, ensure wounds or lesions are covered.</li> <li>Remove and dispose of PPE, then perform hand hygiene, prior to transporting patients on Contact Precautions. DO NOT wear PPE outside of a patient's room.</li> <li>Put on clean PPE to assist the patient once at the destination in the hospital.</li> </ul>
Cleaning	<ul style="list-style-type: none"> <li>Ensure rooms of patients on Contact Precautions are frequently cleaned and disinfected (at least daily and prior to use by another patient). Focus cleaning on toilets, frequently-touched surfaces, and equipment in the immediate patient area.</li> <li>Use gloves and gown when cleaning patient care equipment and the environment of a patient who has been on Contact Precautions. Remove and discard gloves and gowns immediately after cleaning is complete.</li> <li>Organisms that form spores require cleaning products, such as bleach, that inactive spores, which are more difficult to destroy than vegetative microorganisms. If bleach is used, it must be prepared fresh daily and properly diluted.</li> </ul>

**Table 38: Droplet Precautions**

Droplet precautions	
<b>Why droplet precautions are needed</b>	<ul style="list-style-type: none"> <li>Droplet Precautions are intended to prevent transmission of pathogens spread through close respiratory or mucous membrane contact with respiratory secretions</li> <li>Patients are placed on Droplet Precautions when they have known or suspected infections transmitted by splashes of respiratory secretions. Droplets are small amounts of liquid from the lungs, mouth, or nose that are expelled into the air when people cough, talk, or sneeze. Droplets can also spread through hands when people sneeze or cough into their hands and then touch mucous membranes of another person or an environmental surface.</li> </ul>
<b>When and how</b>	<ul style="list-style-type: none"> <li>Triage will identify which patients require droplet precautions. Health workers should be made aware of the clinical syndromes and conditions requiring droplet precautions (see table XX Clinical Syndromes/Conditions Warranting Empiric TBPs in addition to Standard Precautions). Patients should wear a surgical mask while awaiting evaluation</li> <li>Because these pathogens do not remain infectious over long distances in a healthcare facility, special air handling and ventilation are not required to prevent droplet transmission.</li> </ul>



Droplet precautions	
	<ul style="list-style-type: none"> <li>Organisms that require Droplet Precautions include <i>B. pertussis</i>, seasonal influenza virus, adenovirus, <i>Neisseria meningitidis</i>, and certain types of pneumonia.</li> <li>Emerging organisms that spread via droplets, such as the viruses that cause severe acute respiratory syndrome (SARS, SARS Cov-2), Middle East respiratory syndrome (MERS), have additional precautions recommended to limit transmission (see annexe 12 Clinical Syndromes/Conditions Warranting Empiric TBPs in addition to Standard Precautions).</li> </ul>
Patient Placement	<ul style="list-style-type: none"> <li>Single-patient rooms are preferred for patients who require Droplet precautions</li> <li>When single-patient rooms are in short supply or not available, apply the following principles to help decision-making: <ul style="list-style-type: none"> <li>Prioritize any single-patient rooms for patients with excessive cough and sputum production.</li> <li>If it becomes necessary to place a patient on Droplet precautions in a room with patients who are not infected with the same pathogen, avoid placing that patient in an area with immunocompromised patients.</li> <li>Ensure patients are physically separated (more than 1 meter/3 feet apart) from each other; if there are privacy curtains, make sure they are drawn.</li> </ul> </li> <li>Ideally, place patient in a single room (<i>See TBP section on considerations in facilities with limited resources</i>).</li> <li>In multi-patient rooms, waiting rooms or similar areas, separation between beds (at least 1 meter or 3 feet) and use of a physical barrier, such as a curtain or divider, is especially important to prevent transmission by droplets.</li> <li>Aerosol-generating procedures should be performed in a negative pressure room. If a negative pressure room is not available, the aerosol-generating procedures can be performed in a room equipped with an exhaust fan draining air into a low-traffic area.</li> </ul>
PPE	<ul style="list-style-type: none"> <li><i>See the PPE chapter for details about how to put on and remove PPE.</i></li> <li>HCWs wear a mask (a respirator is not necessary) for close contact with infectious patients; the mask is generally donned upon room entry.</li> <li>Additional PPE might be indicated, depending on the nature of the patient interaction—in other words, based on a risk assessment.</li> <li>Remove and properly discard PPE before exiting the patient room. Perform hand hygiene immediately after removing PPE.</li> </ul>
Patient transport	<ul style="list-style-type: none"> <li>When transport is necessary, instruct the patient to wear a mask and follow Respiratory Hygiene and Cough Etiquette.</li> <li>No mask is indicated for HCWs transporting patients on Droplet precautions.</li> <li>If the patient cannot tolerate a mask, HCP should put on a mask for patient transport and provide tissues to the patient to use when coughing.</li> </ul>
Cleaning	<ul style="list-style-type: none"> <li>Maintain routine cleaning and terminal cleaning practices.</li> </ul>

**Table 39: Airborne Precautions**

Airborne precautions	
<b>Why airborne precautions are needed</b>	<ul style="list-style-type: none"> <li>Airborne transmission occurs when microorganisms are aerosolized into tiny particles that become suspended in air and travel on air currents over long distances. This can happen when an infected person coughs, talks, or sneezes. Microorganisms can also be aerosolized during medical procedures and by medical equipment. Since some microorganisms can survive on air currents over long periods, they can be inhaled by susceptible persons who have not had face-to-face contact (or been in the same room) with an infectious person.</li> </ul>

Airborne precautions	
	<ul style="list-style-type: none"> <li>• Airborne Precautions prevent transmission of these infectious agents that remain infectious over long distances when suspended in the air.</li> </ul>
<b>When and how</b>	<ul style="list-style-type: none"> <li>• Triage will identify which patients require airborne precautions. Health workers should be made aware of the clinical syndromes and conditions requiring airborne precautions (see table XX Clinical Syndromes/Conditions Warranting Empiric TBPs in addition to Standard Precautions)</li> <li>• Patients should wear a surgical mask while awaiting evaluation.</li> <li>• Organisms that require Airborne Precautions include Mycobacterium tuberculosis, the measles virus, and the varicella zoster virus (chickenpox).</li> <li>• Some AGPs have been associated with an increased risk of transmission of coronaviruses (SARS-CoV-1, SARS-CoV-2 and MERS-CoV). The current WHO list of these AGPs is: tracheal intubation, non-invasive ventilation (e.g., BiPAP, CPAP), tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation, bronchoscopy, sputum induction induced by using nebulized hypertonic saline, and autopsy procedures. It remains unclear whether aerosols generated by nebulizer therapy or high-flow oxygen delivery are infectious, as data on this is still limited.</li> </ul>
Patient Placement	<ul style="list-style-type: none"> <li>• Ideally, patients should be placed in an airborne infection isolation room (AIIR) - a room specifically designed with special air handling and ventilation systems to prevent transmission of airborne infections. AIIR design includes: <ul style="list-style-type: none"> <li>○ negative pressure (air flows from corridor to inside the patient room) compared to the corridor, and 6—12 air exchanges per hour</li> <li>○ direct exhaust of air to the outside, away from places where people walk or congregate and any air intake openings</li> <li>○ a door kept closed when not required for entry and exit</li> </ul> </li> <li>• If an AIIR is not available, place patients in a room designed with ventilation in mind and keep doors closed. Ideally, any room intended for patients on Airborne Precautions is away from heavy traffic areas in the healthcare facility and does not share ventilation with any other patient rooms or wards.</li> <li>• Ventilation moves outdoor air into a building or a room and distributes the air within that building or room. <b>Natural ventilation</b> is when natural forces, such as wind, move air in and out of a room. [Consult WHO Manual on Natural Ventilation for Infection Control in Healthcare Settings]</li> <li>• To provide natural ventilation: <ul style="list-style-type: none"> <li>○ Use a room that has good cross-ventilation (two or more windows that open) to the outdoors.</li> <li>○ Use an exhaust fan in one window to assist moving room air to the outdoors, making sure the exhaust window is away from people and any air intake openings.</li> <li>○ Turn off air-conditioning and open windows to enhance ventilation if an independent air supply is not available.</li> <li>○ Keep the door to the hallway closed, except for when HCP enter and exit the room.</li> </ul> </li> <li>• Movements in and out of the room should be limited to HCWs caring for the patient.</li> <li>• Restrict susceptible HCWs from entering the room of patients known or suspected to have measles, chickenpox, disseminated zoster, or smallpox if other immune HCWs are available.</li> </ul> <p>Immunize susceptible persons as soon as possible following unprotected contact with vaccine-preventable infections (e.g., measles, chickenpox,)</p>

Airborne precautions	
PPE	<ul style="list-style-type: none"> <li>• See the PPE chapter for details about how to put on and remove PPE.</li> <li>• HCWs caring for patients on Airborne Precautions wear a particulate respirator, such as a fit-tested N95 mask, and conduct a seal check before entering the patient's room. A seal check should be performed every time the N95 mask is worn.</li> <li>• Gown, gloves, and eye protection are not needed for many organisms transmitted exclusively by the airborne route (such as <i>M. tuberculosis</i>, and the varicella virus), but may be needed when an infectious microorganism is transmitted by multiple routes or when multiple pathogens are possible, as is the case with influenza, SARS Cov-2 and tuberculosis.</li> <li>• COVID-19-specific guidance: health workers performing AGPs or in settings where AGPs are performed among suspected or confirmed COVID-19 patients (e.g., intensive care units or semi-intensive care units) should: <ul style="list-style-type: none"> <li>○ Perform procedures in an adequately ventilated room</li> <li>○ use appropriate PPE: wear a particulate respirator at least as protective as a US National Institute for Occupational Safety and Health (NIOSH)-certified N95, European Union (EU) standard FFP2, or equivalent.</li> <li>○ Although initial fit testing is needed prior to the use of a particulate respirator, many countries and health-care facilities do not have a respiratory fit testing programme. Therefore, it is critical that when health workers put on a disposable particulate respirator, they should always perform the required seal check to ensure there is no leakage.</li> <li>○ Note that if the wearer has a beard or other thick facial hair this may prevent a proper respirator fit.</li> <li>○ Other PPE items include eye protection (i.e., goggles or a face shield), long-sleeved gown and gloves. If gowns are not fluid resistant, health workers performing AGPs should use a waterproof apron if the procedure is expected to produce a large volume of fluid that might penetrate the gown;</li> <li>○ in the intensive care units, where AGPs are frequently performed, the health worker may choose to wear a particulate respirator throughout his or her shift, in areas of community transmission;</li> <li>○ keep the number of persons present in the room or unit to the absolute minimum required for the patient's care and support.</li> </ul> </li> </ul>
Transport	<ul style="list-style-type: none"> <li>• When transport is necessary, instruct the patient to wear a mask and follow respiratory hygiene and cough etiquette.</li> <li>• Cover any skin lesions associated with varicella or <i>M. tuberculosis</i> to prevent aerosolization or contact with the pathogen in skin lesions.</li> <li>• No mask or respirator is indicated for HCP transporting patients on Airborne Precautions if the patient is wearing a mask and infectious skin lesions are covered.</li> <li>• If the patient cannot tolerate a mask, HCP should put on a mask for patient transport and provide tissues to the patient to use when coughing.</li> </ul>
<i>Cleaning</i>	<ul style="list-style-type: none"> <li>• Use a respirator when cleaning patient care equipment and the environment of a patient who has been on Airborne Precautions. Once terminal cleaning of the room and all equipment has been completed, wait for aerosols to clear the room before entering an Airborne Precautions room without a respirator.</li> </ul>

## Chapter 5: Aseptic technique & device management for invasive procedures (including surgery)

### Relevant international and national guidance and tools

- WHO Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level <https://www.who.int/infection-prevention/publications/ipc-components-guidelines/en/>
- WHO Minimum Requirements for infection prevention and control (IPC) programmes <https://www.who.int/infection-prevention/publications/min-req-IPC-manual/en/>
- WHO IPC training modules <https://www.who.int/infection-prevention/tools/core-components/en/>
- WHO IPC e-learning modules <https://ipc.ghelearning.org/>

### General introduction

Aseptic technique aims to protect patients by minimizing the introduction of potentially harmful microorganisms into susceptible sites during invasive procedures, including during insertion of invasive devices and their ongoing maintenance, and during wound care. Asepsis is achieved by ensuring that (gloved) hands, equipment and instruments that come into contact with patient's susceptible sites are sterile. WHO Guidelines on Core Components of IPC programmes and the sister document Minimum Requirements state as a minimum that health care facility SOPs should include aseptic techniques (primary care) & aseptic techniques for invasive procedures including surgery (secondary and tertiary care). Surgical asepsis relates to procedures/processes designed to prevent surgical site infection and is covered in chapter 10, IPC in special areas of the hospital (Operating Room).

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

### Key practice points:

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

### Introduction - Why aseptic technique is necessary for invasive procedures

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

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

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

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

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

### Considerations in facilities with limited resources

These considerations are addressed in the following sections, focused on the different invasive procedures that require application of an aseptic technique.

### Additional considerations

The inappropriate use of multi-use antiseptic solutions, sterile saline, water, lubricants, and use of multi-dose vials can result in contamination and documented outbreaks have been reported.

If a breach in aseptic technique occurs e.g., due to an emergency this should be documented and the infection risks mitigated as soon as possible.

Table 40: General approach to using a multimodal strategy for aseptic technique and invasive procedures

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

## Chapter 5.1: Blood Stream Infection (BSI) Prevention

### Relevant international and national guidance and tools

- My 5 Moments for Hand Hygiene Focus on caring for a patient with a peripheral venous catheter [https://www.who.int/gpsc/5may/HH15\\_PeripheralCatheter\\_A3\\_EN.pdf?ua=1](https://www.who.int/gpsc/5may/HH15_PeripheralCatheter_A3_EN.pdf?ua=1)
- My 5 Moments for Hand Hygiene Focus on caring for a patient with a central venous catheter [https://www.who.int/gpsc/5may/HH15\\_CentralCatheter\\_A3\\_EN.pdf?ua=1](https://www.who.int/gpsc/5may/HH15_CentralCatheter_A3_EN.pdf?ua=1)
- WHO IPC training modules <https://www.who.int/infection-prevention/tools/core-components/en/>
- WHO IPC e-learning module, blood stream infection <https://ipc.ghelearning.org/>

### Key practice points:

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

### Introduction - why IPC is important for BSI prevention

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

### How and when to prevent BSI

Table 41 lists best practices for BSI prevention during insertion, maintenance and removal of peripheral and central venous cannula.

**Table 41: Best practices for inserting maintaining & removal of peripheral and central venous catheters**

Prevention of BSI – Peripheral IV cannula	
Placement	Maintenance & removal
<ul style="list-style-type: none"> <li>• Cannulation only if clinically indicated (never for convenience)</li> </ul>	<ul style="list-style-type: none"> <li>• Review the need of IV cannula and remove if no longer required</li> </ul>
<ul style="list-style-type: none"> <li>• Prepare a tray of items required for catheter placement</li> </ul>	<ul style="list-style-type: none"> <li>• Keep the dressing clean and dry – can stay for up to 72 to 96hrs.</li> </ul>
<ul style="list-style-type: none"> <li>• Perform hand hygiene (moment 2 and 3) and use sterile gloves when placing the cannula only.</li> </ul>	<ul style="list-style-type: none"> <li>• Use an aseptic technique for ongoing daily cannula care</li> </ul>
<ul style="list-style-type: none"> <li>• Use an aseptic non-touch technique following the procedure for insertion of a peripheral cannula</li> </ul>	<ul style="list-style-type: none"> <li>• Change the dressing if wet or soiled or immediately after administration of blood.</li> </ul>
<ul style="list-style-type: none"> <li>• Clean site with an antiseptic and let dry before cannulation.</li> <li>• If site is visibly dirty, wash with soap</li> </ul>	<ul style="list-style-type: none"> <li>• Replace the IV cannula whenever cannula related complications occur (occlusion, phlebitis or infection). If required, insert a new cannula at an</li> </ul>

Prevention of BSI – Peripheral IV cannula	
Placement	Maintenance & removal
and water before applying the skin antiseptic.	alternate site.
<ul style="list-style-type: none"> <li>Use sterile transparent dressing or sterile gauze dressing if not available.</li> </ul>	<ul style="list-style-type: none"> <li>Perform hand hygiene (moment 3 or 4).</li> </ul>
<ul style="list-style-type: none"> <li>Secure cannula to prevent any unnecessary movement</li> </ul>	<ul style="list-style-type: none"> <li>Perform hand hygiene</li> </ul>
<ul style="list-style-type: none"> <li>Note the date of cannula insertion</li> </ul>	
Prevention of BSI – Central venous catheter	
<ul style="list-style-type: none"> <li>Prepare a tray of items required for catheter placement. Always use sterile items and equipment.</li> </ul>	<ul style="list-style-type: none"> <li>Daily review the need for the catheter and remove if no longer required or infection is suspected.</li> </ul>
<ul style="list-style-type: none"> <li>Use single lumen unless indicated otherwise.</li> </ul>	<ul style="list-style-type: none"> <li>Keep dressing clean and dry.</li> </ul>
<ul style="list-style-type: none"> <li>Use aseptic technique during insertion.</li> </ul>	<ul style="list-style-type: none"> <li>Change dressing if it becomes wet, soiled or loosened.</li> </ul>
<ul style="list-style-type: none"> <li>Clean site with an antiseptic and let it dry before insertion</li> </ul>	<ul style="list-style-type: none"> <li>Use an aseptic non-touch technique for ongoing daily cannula care</li> </ul>
<ul style="list-style-type: none"> <li>Secure catheter with suture or clips to prevent unnecessary movement.</li> </ul>	<ul style="list-style-type: none"> <li>Wear gloves for dressing change or exit site care.</li> </ul>
<ul style="list-style-type: none"> <li>Use sterile transparent dressing or sterile gauze, if</li> <li>transparent dressing is not available.</li> </ul>	<ul style="list-style-type: none"> <li>Always disinfect the needless access devices and manipulate open hubs with gauze (soaked in alcohol)</li> </ul>
<ul style="list-style-type: none"> <li>Protect insertion site from outside contamination.</li> </ul>	<ul style="list-style-type: none"> <li>Always prepare infusates using aseptic technique.</li> </ul>
<ul style="list-style-type: none"> <li>Note the date of catheter insertion.</li> </ul>	

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

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

#### Considerations in facilities with limited resources

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

#### Additional considerations

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

**Table 42: Approach to using a multimodal strategy for BSI prevention**

<p>System change – build it <i>(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</i></p>	<ul style="list-style-type: none"> <li>• Ensure the necessary infrastructure and resources to enable measures to prevent BSI (e.g., appropriate catheter material and type, adequate staffing, pre-prepared cannula insertion kits, PPE, hand hygiene supplies, catheter securing devices, etc.)</li> <li>• Good infrastructure and available resources can streamline interventions for consistent care and make implementation easier and safer.</li> <li>• Availability and access to guidelines, policies and procedures for staff</li> </ul>
<p>Training and education – teach it <i>(to improve health worker knowledge)</i></p>	<ul style="list-style-type: none"> <li>• Ensure that practical training and education methods are aligned with the recommendations for BSI prevention. Insufficient knowledge – particularly of BSI recommendations based on scientific evidence and why they are important – is a major obstacle to change.</li> <li>• Use onsite courses, simulations and videos, group discussions, bedside training, e-learning</li> </ul>
<p>Monitoring and feedback – check it <i>(to assess the problem, drive appropriate change and document practice improvement)</i></p>	<ul style="list-style-type: none"> <li>• Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) related to catheter insertion and maintenance as a key process indicator. Evaluate regularly and report results in a timely manner.</li> <li>• Monitor BSI e.g., as part of a programme of surveillance for device-associated infections and provide feedback to wards and departments</li> </ul>
<p>Reminders and communication – sell it <i>(to promote the desired actions, at the right time, including campaigns)</i></p>	<ul style="list-style-type: none"> <li>• Use visual protocols relating to insertion and make available at the point of care and where the procedure takes place. In addition, use posters to act as reminders for daily review of the need for catheterisation, posters addressing hand hygiene in the context of cannula (PVC and CVC), brochures, organizational charts, infographics as appropriate</li> <li>• Communicate with patients and their visitors about the need for a cannulas and prevention methods.</li> </ul>
<p>Culture and change – live it <i>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</i></p>	<ul style="list-style-type: none"> <li>• Create an environment and perceptions that facilitate awareness of BSI prevention at all levels. Nurture a climate that understands and prioritizes safety and IPC issues. The culture of a hospital influences how teams work together and how valued people feel – and how they perform day to day. It can influence staff perceptions of their ability to make a change – e.g., to safer, evidence-based practices</li> <li>• Clinical leads should act as role models. Managers should ensure budgets are made available for necessary equipment and supplies including hand hygiene materials and support quality improvement.</li> </ul>



## Chapter 5.2: Urinary catheterization and CAUTI

### Relevant international and national guidance and tools

- WHO training: Prevention of catheter-associated urinary tract infections (CAUTI) [https://www.who.int/infection-prevention/tools/core-components/CAUTI\\_presentation.pptx](https://www.who.int/infection-prevention/tools/core-components/CAUTI_presentation.pptx)
- WHO: How to insert an indwelling urinary catheter animated video <https://youtu.be/7a4aNfJoZdQ>
- My 5 Moments for Hand Hygiene Focus on caring for a patient with a Urinary Catheter [https://www.who.int/gpsc/5may/hh-urinary-catheter\\_poster.pdf?ua=1](https://www.who.int/gpsc/5may/hh-urinary-catheter_poster.pdf?ua=1)
- WHO CAUTI e-learning module <https://ipc.qhelearning.org/>

### Key practice points:

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

### Introduction - Why IPC is important for CAUTI prevention

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

### How and when to prevent CAUTI

Table 43 lists the measures to be taken to prevent CAUTI at the time of insertion and during ongoing maintenance of the catheter.

**Table 43: Preventing CAUTI**

Prevention of CAUTI	
During insertion	During ongoing maintenance
Catheterize only if clinically indicated (never for convenience)	Review urinary catheter necessity daily and remove promptly.
Use a closed urinary drainage system	Maintain a closed draining system. If a urine specimen is required, take specimen aseptically via the sampling port - disinfect port by wiping with a 70% alcohol swab & perform hand hygiene (moments 2 & 3)
Use an aseptic non-touch technique (sterile gloves and equipment) following the	Use an aseptic technique for ongoing daily catheter care

Prevention of CAUTI	
During insertion	During ongoing maintenance
procedure for insertion of a urinary catheter below	Do not change the catheter routinely if it is functioning properly
	Empty the drainage bag regularly into a clean receptacle used only on one patient and perform hand hygiene before and after (moments 2 & 3)
	Correctly position drainage bag below the level of the bladder (and never on the floor) to prevent back flushing In case of need e.g., during transportation, clamp the urinary bag tube to prevent backflow.
	Perform daily meatal hygiene with soap and water only – involve the patient in their care

### Procedure for insertion of a urinary catheter

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

Refer to Annex 2 for a step-by-step outline of urinary catheterization.

### Considerations in facilities with limited resources

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

### Additional considerations

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

**Table 45: Approach to using a multimodal strategy for prevention of CAUTI**

System change – build it <i>(The system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</i>	<ul style="list-style-type: none"> <li>• Ensure the necessary infrastructure and resources to enable measures to prevent CAUTI (e.g., appropriate catheter material and type, adequate staffing, pre-prepared CAUTI insertion kits, PPE, hand hygiene supplies, urinals, bedpans, catheter securing devices, lubricating gel (single- vs multi-use), gloves)</li> <li>• Good infrastructure and available resources can streamline interventions for consistent care and make implementation easier and safer. <ul style="list-style-type: none"> <li>▪ Availability and access to guidelines, policies and procedures for staff</li> </ul> </li> </ul>
Training and education – teach it <i>(to improve health worker knowledge)</i>	<ul style="list-style-type: none"> <li>• Ensure that practical training and education methods are aligned with the recommendations for CAUTI prevention. Insufficient knowledge – particularly of CAUTI recommendations based on scientific evidence and why they are important – is a major obstacle to change. <ul style="list-style-type: none"> <li>▪ Use on site courses, simulations and videos, group discussions, bedside training, e-learning)</li> </ul> </li> </ul>

<p>Monitoring and feedback – check it <i>(To assess the problem, drive appropriate change and document practice improvement)</i></p>	<ul style="list-style-type: none"> <li>Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) on compliance with catheter insertion and maintenance as a key process indicator. Evaluate regularly and report results in a timely manner. Use checklists, algorithms, monitoring forms e.g., WHO hand hygiene observation tools, CAUTI surveillance systems, Stop orders</li> <li>Monitor CAUTI e.g., as part of a programme of surveillance for device-associated infections and provide feedback to wards and departments</li> </ul>
<p>Reminders and communication – sell it <i>(to promote the desired actions, at the right time, including campaigns)</i></p>	<ul style="list-style-type: none"> <li>Use visual protocols relating to insertion and make available at the point of care and where the procedure takes place. In addition, use posters to act as reminders for daily review of the need for catheterization, posters addressing hand hygiene in the context of CAUTI, brochures, organizational charts, infographics as appropriate</li> <li>Communicate with patients and their visitors about the need for a urinary catheter and prevention methods.</li> </ul>
<p>Culture and change – live it <i>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</i></p>	<ul style="list-style-type: none"> <li>Create an environment and perceptions that facilitate awareness of CAUTI prevention at all levels. Nurture a climate that understands and prioritizes safety and IPC issues. The culture of a hospital influences how teams work together and how valued people feel – and how they perform day to day. It can influence staff perceptions of their ability to make a change – e.g., to safer, evidence-based practices</li> <li>Clinical leads should act as role models. Managers should ensure budgets are made available for necessary equipment and supplies including hand hygiene materials and support quality improvement.</li> </ul>

## Chapter 5.3: Hospital acquired pneumonia (HAP) and ventilator associated pneumonia (VAP) prevention

### Relevant international and national guidance and tools

Guidelines for Preventing Health-Care-Associated Pneumonia, 2003

<https://www.cdc.gov/infectioncontrol/pdf/guidelines/healthcare-associated-pneumonia-H.pdf>

Strategies to Prevent Ventilator-Associated Pneumonia in Acute Care Hospitals, 2014 (CDC)

[https://www.jstor.org/stable/10.1086/677144#metadata\\_info\\_tab\\_contents](https://www.jstor.org/stable/10.1086/677144#metadata_info_tab_contents)

### Key practice points:

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

### Introduction - why IPC is important for HAP/VAP prevention

Healthcare associated pneumonia (HAP) is a common HAI with a significant risk of a fatal outcome. Most of these infections occur by aspiration of bacteria growing in the back of the throat or in the stomach.

Pneumonia associated with mechanical ventilation may be referred to as ventilator associated pneumonia (VAP). The range of microorganisms associated with HAP/VAP is much wider than is the case for community acquired pneumonia (CAP) and many of these microorganisms are much more likely to be resistant to antimicrobials. Therefore, HAP/VAP may be much harder to treat effectively with antimicrobial agents than CAP.

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

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

Other procedures that could increase the risk of pneumonia include oxygen therapy, intermittent positive pressure ventilation (IPPV) treatment, and endotracheal suctioning. The combination of severe illness, the presence of multiple invasive devices (intravenous catheters, urinary catheters, and mechanical ventilators), and frequent contact with the hands of HCWs often leads to cross-contamination and patient infection.

### How and when to prevent HAP & VAP

Table 46 lists best practices for HAP & VAP prevention during placement and maintenance of mechanical ventilation.

**Table 46: Best practices for prevention of HAP & VAP**

<b>HAP prevention best practices</b>	
<ul style="list-style-type: none"> <li>• Strict adherence to hand hygiene (see Hand Hygiene chapter for more details).</li> <li>• Performing routine oral care</li> <li>• Early mobilization (i.e., post-surgery)</li> <li>• Treatment of dysphagia</li> <li>• Swift diagnosis</li> </ul>	
<b>VAP (mechanically assisted) prevention best practices</b>	
<b>Placement</b>	<b>Maintenance</b>
<ul style="list-style-type: none"> <li>• Consider use of non-invasive ventilation when possible.</li> <li>• Insert endotracheal tube (ET) only for appropriate indication.</li> </ul>	<ul style="list-style-type: none"> <li>• Daily assessment of sedation with readiness to extubate.</li> </ul>
<ul style="list-style-type: none"> <li>• Perform hand hygiene (moment 2 and 3)</li> </ul>	<ul style="list-style-type: none"> <li>• Perform hand hygiene (moment 2, 3, or 4) and aseptic technique</li> </ul>
<ul style="list-style-type: none"> <li>• Ensure appropriate size of ET is used.</li> </ul>	<ul style="list-style-type: none"> <li>• Unless contraindicated, keep the head of the patient's bed elevated at 30<sup>0</sup>-45<sup>0</sup> – avoid laying the patient completely flat.</li> </ul>
<ul style="list-style-type: none"> <li>• Ensure only properly trained HCWs perform the procedure.</li> </ul>	<ul style="list-style-type: none"> <li>• Oral hygiene: Brush 12 hourly with standard toothpaste, and clean mouth with chlorhexidine gluconate (≥ 1– 2% gel or liquid) 6 hourly.</li> </ul>
<ul style="list-style-type: none"> <li>• Use aseptic technique and sterile equipment for insertion.</li> </ul>	<ul style="list-style-type: none"> <li>• Education and training of staff in appropriate airway management.</li> </ul>
<ul style="list-style-type: none"> <li>• Set (and maintain) appropriate ET cuff pressure between 20-30 cm H<sub>2</sub>O (or 2 cm H<sub>2</sub>O above peak aspiratory pressure).</li> </ul>	<ul style="list-style-type: none"> <li>• Cuff pressure control and monitoring 6-hourly</li> </ul>
	<ul style="list-style-type: none"> <li>• Avoid routine change of ventilator circuit, humidifiers and endotracheal.</li> </ul>
	<ul style="list-style-type: none"> <li>• Use sterile water in humidifier and maintain appropriate humidification of inspired gas.</li> </ul>
	<ul style="list-style-type: none"> <li>• Perform subglottic suctioning of respiratory secretions.</li> </ul>

## Considerations in facilities with limited resources

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

## Additional considerations

- Adhere to standard precautions to maximize prevention of cross-transmission of microorganisms.
- Additionally, patients should be educated about the following postoperative practices that can prevent development of healthcare-associated pneumonia:
  - Deep breathing
  - Moving in bed
  - Frequent coughing
- If reusable breathing circuits are used, they must be cleaned and appropriately decontaminated between patients according to the manufacturers' guidance and by the HCF central sterilization services department. Disposable (single patient use) breathing circuits eliminate this risk of cross-transmission but are expensive. Breathing circuits intended for single patient use are not suitable for decontamination and reuse.
- Discard waste appropriately (refer to chapter 3.6).
- Avoid prolonged use of nasal gastric tubes for feeding.
- Feed small, frequent amounts rather than large amounts at one time.
- Ensure patients stop taking solid foods 4-6 hours prior to general anaesthesia.

**Table 47: Approach to using a multimodal strategy for the prevention of HAP/VAP**

<p>System change – build it <i>(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</i></p>	<ul style="list-style-type: none"> <li>• Ensure the necessary infrastructure and resources to enable measures to prevent HAP/VAP (e.g., appropriate ET material and type, adequate staffing, pre-prepared kits, PPE, hand hygiene supplies, sterile service department, etc.)</li> <li>• Good infrastructure and available resources can streamline interventions for consistent care and make implementation easier and safer.           <ul style="list-style-type: none"> <li>▪ Availability and access to guidelines, policies and procedures for staff</li> </ul> </li> </ul>
<p>Training and education – teach it <i>(to improve health worker knowledge)</i></p>	<ul style="list-style-type: none"> <li>• Ensure that practical training and education methods are aligned with the recommendations for HAP/VAP prevention. Insufficient knowledge – particularly of HAP/VAP recommendations based on scientific evidence and why they are important – is a major obstacle to change.           <ul style="list-style-type: none"> <li>▪ Use on site courses, simulations and videos, group discussions, bedside training, e-learning</li> </ul> </li> </ul>
<p>Monitoring and feedback – check it <i>(to assess the problem, drive appropriate change and document practice improvement)</i></p>	<ul style="list-style-type: none"> <li>• Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) related to compliance with HAP/VAP placement and maintenance as a key process indicator. Evaluate regularly and report results in a timely manner.</li> <li>• Monitor VAPs e.g., as part of a programme of surveillance for device-associated infections and provide feedback to wards and departments</li> </ul>
<p>Reminders and communication – sell it <i>(to promote the desired actions, at the right time, including campaigns)</i></p>	<ul style="list-style-type: none"> <li>• Use visual protocols relating to insertion and make available at the point of care and where the procedure takes place. In addition, use posters to act as reminders for daily review, posters addressing hand hygiene, brochures, organizational charts, infographics as appropriate</li> <li>• Communicate with patients and their visitors about the need for prevention methods.</li> </ul>

<p>Culture and change – live it</p> <p><i>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</i></p>	<ul style="list-style-type: none"> <li>• Create an environment and perceptions that facilitate awareness of HAP/VAP prevention at all levels. Nurture a climate that understands and prioritizes safety and IPC issues. The culture of a hospital influences how teams work together and how valued people feel – and how they perform day to day. It can influence staff perceptions of their ability to make a change – e.g., to safer, evidence-based practices</li> <li>• Clinical leads should act as role models. Managers should ensure budgets are made available for necessary equipment and supplies including hand hygiene materials and support quality improvement.</li> </ul>
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## Chapter 5.4: Wound management/SSI

### Relevant international and national guidance and tools

- WHO Global guidelines on the prevention of surgical site infection <https://www.who.int/gpsc/ssi-prevention-guidelines/en/>
- WHO My 5 Moments for Hand Hygiene Focus on caring for a patient with a post-operative wound <https://www.who.int/gpsc/5may/5moments-EducationalPoster.pdf?ua=1>
- WHO infographic: hand hygiene and the surgical patients journey <https://www.who.int/gpsc/5may/5moments-EducationalPoster.pdf?ua=1>
- WHO IPC training: Prevention of surgical site infection (SSI) <https://www.who.int/infection-prevention/tools/core-components/en/>
- WHO e-learning module: surgical site infection <https://ipc.ghelearning.org/>
- WHO WHO training video – surgical wound evaluation and dressing <https://www.youtube.com/watch?v=Y1qZZvY9ft4&feature=youtu.be>

### Key practice points:

- Routinely check the surgical wound site for signs of infection
- Perform hand hygiene as per WHO Moments 2 (before clean/aseptic procedure) & 3 (after body fluid exposure risk) when performing surgical wound care (see chapter 3.1)
- Maintain an aseptic or non-touch technique when providing any wound care (see chapter 5)
- Perform prompt sample collection if a wound infection is suspected
- Apply post-operative wound dressings (after initial surgical wound dressing removal) only when wounds are exuding and suspected of infection.

### Introduction – why do we need to manage surgical wounds

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

### When to manage surgical wounds

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

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

### How to manage surgical wounds

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

A step-by-step procedure for post-operative wound care can be found in annex 2.

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

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

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

### Additional considerations

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

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

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

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

**Table 48: Improving surgical wound management through a multimodal strategy**

<p>System change – build it <i>(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</i></p>	<ul style="list-style-type: none"> <li>• Establish a careful local decision-making process to ensure purchase of necessary sterile items for surgical wound management including not to purchase advanced dressings. This may require presentation of data on cost-effectiveness and proposals for investing resources in other preventive measures to avoid SSI.</li> <li>• Make available functional hand hygiene facilities.</li> </ul>
<p>Training and education – teach it <i>(to improve health worker knowledge)</i></p>	<ul style="list-style-type: none"> <li>• Put in place/improve a reliable mechanism for producing/ using updated training resources and information for all relevant staff on surgical wound management (use the WHO video on caring for a postoperative wound).</li> </ul>

<p>Monitoring and feedback – check it <i>(to assess the problem, drive appropriate change and document practice improvement)</i></p>	<ul style="list-style-type: none"> <li>• Identify the expertise required to conduct training.</li> <li>• Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) regarding availability of standard dressings, sterile packs, wound management practices, SSI rates.</li> </ul>
<p>Reminders and communication – sell it <i>(to promote the desired actions, at the right time, including campaigns)</i></p>	<ul style="list-style-type: none"> <li>• In collaboration with staff, develop/adapt/ implement reminders and agree upon their most relevant placement, to encourage appropriate postoperative wound management practices, for example, posters, flyers or stickers, including on the use of standard dressings.</li> </ul>
<p>Culture and change – live it <i>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</i></p>	<ul style="list-style-type: none"> <li>• Identify champions to promote the correct post-operative wound management within the surgical team.</li> </ul>



## Chapter 6: Reprocessing of medical devices

### Relevant international and national guidance and tools

- Decontamination and Reprocessing of Medical Devices for Health-care Facilities <https://www.who.int/infection-prevention/publications/decontamination/en/>
- WHO e-learning module: decontamination and sterilization <https://ipc.ghelibrary.org/>

### Key practice points:

- Classify medical devices according to the Spaulding Classification system to determine level of risk and method of decontamination required.
- Conduct effective reprocessing of medical devices and equipment cleaning prior to both disinfection and sterilisation.
- Provide adequate protection for those undertaken decontamination activities.
- Focus on a combination of infrastructure/resources, the use of reminders (e.g., posters), training and education (consistent with guideline content), monitoring and evaluation (using a valid and reliable approach) and a safety culture, to make it more likely that decontamination will be conducted effectively.

### Introduction - why do we reprocess medical devices

- Decontamination is the process of removing soil and pathogenic microorganisms from objects, such as medical devices, so they are safe to handle, whether that involves further processing (sterilization), use or disposal. There are three parts to decontamination: cleaning, disinfection and sterilization.
- Note that in the United States, the term 'decontamination' generally refers to only disinfection and/or sterilization; the cleaning step is excluded. In the United Kingdom and Europe, 'decontamination' refers to the entire process, including cleaning, disinfection and/or sterilization; this is the definition we will be using.
- All medical devices and equipment used in healthcare environments have the potential to become contaminated with microorganisms.
- Once medical devices and equipment are contaminated, they present a risk to patients, as well as to staff, both in the immediate environment and to those who subsequently handle them (e.g., technicians).
- To minimise the potential risk of infection to patients and staff, it is important that safe and effective decontamination of all re-usable equipment between use is implemented. This is an essential part of infection prevention and control practices of a health care facility.

This section provides a brief summary on the decontamination and reprocessing of reusable patient care equipment. For more comprehensive details refer to the WHO manual 'Decontamination and Reprocessing Manual for Health care facilities.

### When to decontaminate medical devices

### Risk assessment and the Spaulding classification

The risk of transferring microbes from instruments and equipment is dependent on the following factors:

- The presence of microorganisms, their number, and their virulence (see Figure 5 Resistance to germicidal activity of chemical disinfectants against various micro-organisms).
- The type of procedure that is going to be performed (invasive or non-invasive).

- The body site where the instrument or equipment will be used (penetrating the mucosal or skin tissue or used on intact skin).
- The Spaulding Classification divides medical devices into three risk categories: critical, semi-critical and non-critical.
- Any patient care item can be categorised into one of three levels: low, intermediate or high based on the risk of the item transmitting microorganisms.
- This classification is useful for understanding the method of decontamination required to ensure safety, breaking the chain of infection, and protecting patients and HCWs from HAI according to the degree of risk for infection involved in use of the items (see Table 32 Spaulding Classification).









Micro-organisms	Examples	Level of disinfection
Prions	 Agents for Creutzfeldt-Jakob disease	Prion reprocessing
Bacterial spores	 <i>Bacillus subtilis</i> , <i>Clostridium sporogenes</i> , <i>Clostridium difficile</i> , etc.	Sterilization
Coccidia	 <i>Cryptosporidium</i>	
Mycobacteria	 <i>Mycobacterium tuberculosis</i>	High level disinfection
Nonlipid or small viruses	 Poliovirus, Coxsackie virus, Rhinovirus, etc.	Intermediate level disinfection
Fungi	 <i>Trichophyton</i> spp., <i>Cryptococcus</i> spp., <i>Candida</i> spp., etc.	
Vegetative bacteria	 <i>Pseudomonas aeruginosa</i> , <i>E. coli</i> , <i>Staph. aureus</i> , <i>Salmonella</i> spp., <i>Neisseria meningitidis</i> , <i>Enterococci</i> , etc.	Low level disinfection
Lipid or medium-sized viruses	 Herpes simplex, Cytomegalovirus, respiratory syncytial, Hepatitis B, Human Immunodeficiency Virus (HIV), etc.	

Figure 9: Resistance to germicidal activity of chemical disinfectants against various micro-organisms

Source: Damani N. Manual of infection prevention and control. Oxford: Oxford University Press; 2019.

### Single-use devices

- A single-use device is a medical device suitable for one-time patient (or multiple times on the same patient depending on its purpose and instructions) use and then discarded.
- Single-use devices, especially when marked as such, cannot be reused or reprocessed safely. Therefore, this practice is not recommended, as outlined in the WHO decontamination manual.

**Table 49: Spaulding Classification**

Risk category	Definition	Example of common items/equipment	Method of decontamination	Required level of microbicidal action
<b>High (Critical)</b>	Critical objects that enter sterile tissue, cavities or bloodstream.	Surgical instruments and devices, urinary catheters, cardiac catheters, implants, needles and syringes, dressing, sutures, delivery sets, dental instruments, rigid bronchoscopes, cystoscopies etc.	Sterilization by heat or chemical sterilants  Examples: Steam, ethylene oxide, gas hydrogen peroxide plasma etc. or using $\geq 2.4\%$ , glutaraldehyde-based formulation 7.5% stabilized hydrogen peroxide, 0.2% peracetic acid).	All microorganisms
<b>Intermediate (Semi-critical)</b>	Semi-critical objects that come in contact with mucous membranes or non-intact skin.	Respiratory therapy & anaesthesia equipment, flexible endoscopes, vaginal specula, laryngoscope blades and airways, reusable bedpans and urinals, etc.	High-level disinfection by heat or chemicals (see annex 6)  Examples: Glutaraldehyde, hydrogen peroxide, ortho-phthalaldehyde, and peracetic acid with hydrogen peroxide	All microorganisms, <b>EXCEPT:</b> high numbers of bacterial spores
<b>Low (Non-critical)</b>	Non-critical objects that come in contact with intact skin only.	Crutches, beds, ECG leads; bedside tables, walls, floors and furniture, toilet seats, baths, basins, theatre table, blood pressure cuff, crutches, stethoscopes, etc.	Low level disinfection (cleaning)  Examples: Ethyl or Isopropyl alcohol (70-90%); Chlorine (0,01-0,05%); Phenolic and Quaternary Ammonium germicidal detergent solutions.	Vegetative bacteria, fungi and lipid viruses <b>ONLY</b>

### How to decontaminate medical devices

#### Sterile services department (SSD) layout and flow

The sterile services department (SSD) is vital for an effective IPC program. The expertise and knowledge of SSD personnel is important to ensure high standards of decontamination. Not all hospitals can afford to have an SSD and a separate surgical services unit to deal with the operating theatres and associated departments. At the least, they should have a single department covering all areas.

#### Establishing an SSD

- Soiled, used equipment should be collected from the wards and then transferred to the SSD where it is cleaned, disinfected or sterilized.
- Afterwards, all equipment must be safely stored until dispatched for use (see Figure 6 Flow diagram).

#### The layout of the SSD

Ideally, physical barriers should separate dirty and clean areas in the reprocessing room. However, if this is not possible (perhaps because of shortage of space or of funds) the same room can be used. The flow of work in a single room for reprocessing of instruments should be designed to minimize the likelihood of contamination (figure 7). Activity patterns should be established in which soiled objects never cross paths with clean, sterilized, or high-level disinfected instruments

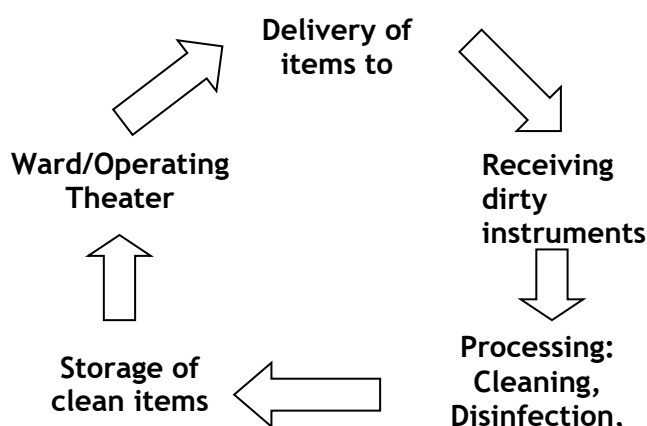


Figure 10: Flow diagram

and other items (refer to figure 6 Flow diagram). General SSD layout principles to consider are:

- Air moves from clean to dirty area.
- Clean and dirty areas have separate storage facilities.
- There are adequate hand hygiene facilities.
- The doors and windows are kept closed in the reprocessing rooms in order to minimize dust contamination and to eliminate flies.
- There is separate equipment for each area.
- The staff are dedicated to work in one area during a shift.

### SSD staff facilities

- All SSD staff should be provided with adequate protective clothing (e.g., heavy duty gloves, plastic aprons, and face protection).
- All staff are trained, not only on the required tasks, but also on the occupational hazards and how to manage them (i.e., sharps safety, use of PPE, associated risks, etc.)
- SSD staff should be immunized against hepatitis B. (See chapter “Occupational Safety and Employee Health”)

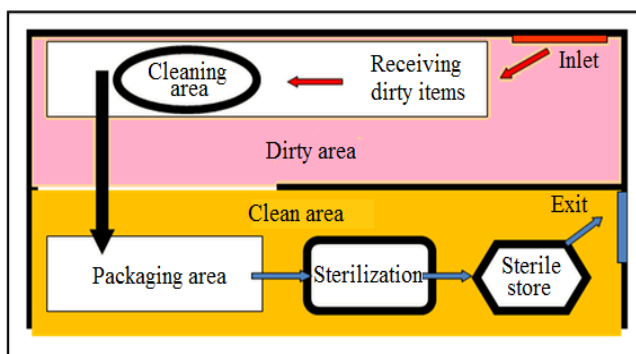


Figure 11: Single room for processing instruments and other items

## Decontamination life cycle (instrument reprocessing)

The life-cycle of decontamination (see Figure 8) illustrates the relevant features of decontamination, with each step being as important as the next.

This cycle represents each stage of the decontamination process, beginning from point of use or acquisition to decontamination followed by storage. This cycle is continuous and demands a minimum standard at every step to ensure safe reuse and handling of medical devices.

Note that cleaning is important, as it is the basis for proper decontamination.

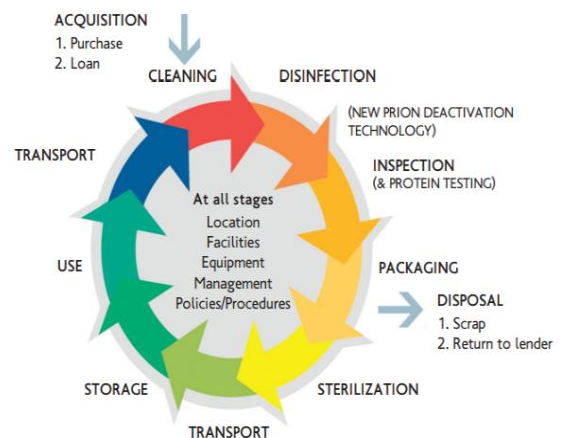


Figure 12: The decontamination life-cycle

Source: Health Technical Memorandum 01-01: management and decontamination of surgical instruments (medical devices) used in acute care. Part A: management and provision. London: Department of Health; 2016.

## Cleaning of medical devices

Cleaning is the removal of all foreign material (dirt and organic matter) from the object being reprocessed. Thorough cleaning will remove most organisms from a surface and should always precede disinfection or sterilization procedures. If instruments and other items have not been cleaned, sterilization or disinfection may not be effective because microorganisms trapped in organic material may resist sterilization or disinfection and may survive. General principles when performing cleaning of medical devices include:

- Effective cleaning is determined by: contact time, temperature, mechanical action, type of detergent and solvent water.
- Detergent is essential to dissolve proteins and oil that can reside on instruments and equipment after use.
- During cleaning, water with detergent should be kept at a temperature range of 27 to 44°C.
- Cleaning may be manual or mechanical.
- All items requiring disinfection or sterilization should be dismantled before cleaning.

## Manual Cleaning

- Manual cleaning is required when mechanical cleaning facilities are not available, for delicate or complex instruments and devices with narrow lumens (i.e., endoscopes).
- Care should be taken not to produce splashes, high-pressure sprays, or aerosols.
- Manual cleaning requires well-trained operators and access to wear appropriate PPE.
- Detergents must be prepared at the concentration recommended by the manufacturer/supplier.
- Do not use hand soap to clean instruments as hand soap can leave soap scum and residue on instruments.
- Visual inspection of the hinges, teeth, and serrated edges should be carried out to ensure cleanliness and any lumens should be irrigated with detergent.
- Medical devices should be rinsed in clean water and then dried.

## Mechanical Cleaning

- Automated cleaning (washer/disinfectors or ultrasonic) are the preferred method as there is minimal handling of dirty equipment by staff.
- Be sure to follow the manufacturer's instructions for use and adhere to the recommended maintenance schedule for optimal performance.
- See Annex 4 for steps on performing manual cleaning of medical devices.

## Inspection, assembly and packaging

- All medical devices should be evaluated prior to disinfection or sterilization. General principles include:
  - Inspection: to ensure all devices are present, visibly clean and functioning correctly
  - Assembly: to ensure all components are present
  - Packaging: to allow penetration, maintain disinfection or sterility and allow aseptic removal. See Annex 5 for steps on how to wrap medical devices for reprocessing using the parcel fold wrapping mechanism.

## Disinfection of medical devices

Disinfection is a process that inactivates non-sporing infectious agents carried out by thermal or chemical processes. Thermal disinfection is preferred whenever possible though heat sensitive items have to be reprocessed with a chemical disinfectant. Items need to be cleaned before being disinfected.

- Thermal disinfection:
  - uses heat and water (i.e., high-pressure cookers or boiling) at temperatures that destroy infectious agents
  - is appropriate for items that are heat and moisture resistant and do not require sterilization.
  - is the simplest, most efficient and cost-effective method of disinfection.
- Chemical disinfection:
  - use chemicals that destroy infectious agents for medical devices that are heat sensitive
  - includes alcohols, chlorine and chlorine compounds, formaldehyde, hydrogen peroxide, phenolics and quaternary ammonium compounds.
  - Are not all made equal and should be chosen based on the intended use.

## Sterilization of medical devices

Sterilization is a validated process which achieves the complete destruction or killing of all microorganisms, including bacterial spores. Sterilization by heat is the preferred method for heat-resistant items and equipment. Sterilization is principally accomplished by steam under pressure/moist heat (autoclaving), dry heat (hot air oven) or low temperature alternatives (chemicals) for heat and moisture sensitive items (i.e., ethylene oxide, hydrogen peroxide gas plasma). When performing steam sterilization, the following general principles should be followed:

- All items must be thoroughly cleaned and dried before loading into the sterilizer.
- The time of steam contact with the devices is crucial and is known as the 'holding time'. Refer to Table 33 for the recommended time and temperature.
- The sterilizers have pressure gauges and thermometers that monitor the sterilization process.
- For effective sterilization, the sterilizer should not be overloaded.

- Written records should be kept of all the testing and maintenance carried out on every sterilizer.
- The records should ideally be kept in a logbook unique to each sterilizer.
- Permanent records should also be kept of every sterilization cycle.
- Sterilization performance must be checked frequently including routine biological, mechanical, and chemical monitoring to ensure that all parameters (see section below) of sterilization are met before using the instrument on patients, as outlined in the WHO Decontamination and Reprocessing Manual.
- If 'flash' or 'immediate-use sterilization system' (IUSS) is used to process surgical items, it should be used immediately and only in emergencies.
- All staff must be trained in autoclave operation and safe handling.

### Moist heat sterilization (autoclaving)

Steam sterilization is the most common and preferred method for sterilization of all critical items if heat stable. Steam sterilization is dependable, nontoxic, inexpensive, sporicidal, and has rapid heating and good penetration of fabrics. See Annex 7 for steps on how to perform steam sterilization.

### Dry heat sterilization (hot air oven):

For dry heat-sterilization to be achieved, a constant supply of electricity is necessary. Dry heat is preferred for reusable glass, metal instruments, oil, ointments and powders. Do not use this method of sterilization for other items, which may melt or burn. Dry heat ovens should have fans to give even temperature distribution and faster equilibrium of load to sterilization temperatures.

**Table 50: Dry heat sterilization temperatures & times**

Holding Temperature	Sterilization Time (After reaching the holding temperature) at hot air ovens without fans	Sterilization Time (After reaching the holding temperature) at hot air ovens with fans
180 °C	1 hour	30 minutes
170°C	2 hours	1 hour
160°C	-----	2 hours

### Chemical sterilization/low temperature sterilization

Low temperature sterilization is used for heat- and moisture- sensitive medical devices. Since the 1950s, ethylene oxide has been the most common method of low temperature gas sterilization. Other methods have emerged that include hydrogen peroxide + gas plasma and immersion in a dilute liquid peracetic acid.

### Monitoring the effectiveness of sterilization (table 34)

To ensure that sterilization has been successful the process of sterilization must be validated. Methods have been developed to monitor the effectiveness of sterilization by measuring various aspects of the process through mechanical, chemical and biological indicators.

## Mechanical indicators

- These indicators, which are part of the autoclave or dry-heat oven itself, record and allow you to observe time, temperature, and/or pressure readings (i.e., printouts) during the sterilization cycle.

## Chemical indicators

- Chemical indicators show that the intended combination of temperature, time, and pressure has been achieved. These indicators can be internal (inside the load) and external (outside the load).
- Examples include:
  - Tape with lines that change colour when the intended temperature has been reached.
  - Pellets in glass tubes that melt, indicating that the intended temperature and time have been reached.
  - Indicator strips that show that the chemicals and/or gas are still effective.
- Chemical indicators are available for testing ethylene oxide, dry heat, and steam processes. These indicators are used internally, placed where steam or temperature takes longest to reach, or put on the outside of the wrapped packs to distinguish processed from non-processed packages.

## Biological indicators

- Biological indicators show whether necessary parameters were met to kill a specified number of microorganisms usually by colour change, for a given sterilization process.
- Typical indicators include heat-resistant bacterial endospores (i.e., *Geobacillus stearothermophilus* for steam sterilizers and *Bacillus subtilis* for dry-heat sterilizers)
- The advantage of this method is that it directly measures the effectiveness of sterilization. The disadvantage is that this indicator is not immediate, as are mechanical and chemical indicators. Bacterial culture results are needed before sterilization effectiveness can be determined.

**Table 51: Recommended processes for sterilization validation**

	What is measured and when	
Cleaning	Daily <ul style="list-style-type: none"> <li>• Use of detergent and disinfection</li> </ul>	Per item <ul style="list-style-type: none"> <li>• Cleaning results by visual control or by using a cleaning test</li> </ul>
Disinfection	Daily <ul style="list-style-type: none"> <li>• Use of disinfectant by concentration, temperature and pH of disinfectant</li> </ul>	Per load <ul style="list-style-type: none"> <li>• Time of exposure</li> </ul>
Chemical sterilization		Per process <ul style="list-style-type: none"> <li>• Biological indicator</li> <li>• Chemical indicator</li> <li>• Physical indicator</li> </ul> Per item <ul style="list-style-type: none"> <li>• External indicator</li> </ul>
Moist heat (steam sterilization)	Daily <ul style="list-style-type: none"> <li>• Bowie-Dick* test for steam penetration in porous loads (pre-vacuum autoclave)</li> <li>• Helix test for hollow lumen instruments</li> <li>• Clean the chamber weekly</li> </ul>	Per process <ul style="list-style-type: none"> <li>• Biological indicator</li> <li>• Chemical indicator</li> <li>• Physical indicator</li> </ul> Per item <ul style="list-style-type: none"> <li>• External indicator</li> </ul>

Source: WHO. Decontamination and Reprocessing Manual for Healthcare Facilities. Geneva: World Health Organization, 2016.



\*Bowie-Dick test: designed to test for air removal in vacuum-assisted steam sterilizers. When using pre-vacuum steam sterilizer to sterilize porous loads such as textiles, cotton rolls, gauze packs, and the like, a Bowie-Dick-type test is recommended. It must be conducted before the first load of goods to be processed every day, or if you are sterilizing loads 24 hours a day, at the same time of day every day for consistency.

## Storage in the SSD

After items have been reprocessed, the sterile packs should be stored in well-ventilated, clean stores ready for dispatch to the wards. Proper storage of sterile instruments and equipment is essential to ensure that the product maintains its level of sterilization or disinfection and the integrity of the wrapping is protected. Collection should be regular and there should be a written record of receipt and delivery. This helps to monitor the use and the loss of instruments. General considerations for storing reprocessed medical devices:

- The storage area for sterile product must be separated from dirty linen, dirty utility/sluice area, and must be away from storage of clinical waste. In addition, the sterile material should be far from sources of moisture.
- Access to the area should be restricted.
- The storage shelves should be located at a minimum distance of 30cm from the floor. 45 cm from the ceiling and 5cm from the wall and should be maintained at the temperature between 15 °C – 28 °C and humidity between 30% – 50%.
- Recommended air exchange in the storage room should 10 changes per hour for a theatre sterile pack store
- Before use, packages should be inspected in order to verify that it meets the requirements of a sterile product
- The item remains sterile until something causes the package or container to become contaminated—the time that has elapsed since sterilization is not always the determining factor

## Considerations in facilities with limited resources

- Sterile services departments can demand a lot of space; however, single room operations care feasible. Consideration should be given as to how best to divide a space into dirty and clean areas and put in place a one-way flow. See Figure 7 for a sample layout when space is limited.
- Sometimes centralizing medical equipment reprocessing (in one large centre that can accommodate) can be ideal for facilities where space or resources are limited.
- See chapter 3.1 (hand hygiene) 3.2 (PPE) 3.3 (environmental cleaning) and (3.6) waste management for additional considerations.

## Additional considerations when decontaminating medical devices

- Do not soak instruments in disinfectant prior to cleaning. Soaking instruments in 0.5% hypochlorite (bleach) solution or any other disinfectant solution during transport or before cleaning is not recommended as it may:
  - damage/corrode the instruments;
  - be inactivated by blood and body fluids, which could;
  - become a source of microbial contamination and formation of biofilm; and
  - pose a risk to healthcare workers and result in inappropriate handling and accidental damage.

**Table 52: Approach to using a multimodal strategy for sterilization and medical devices decontamination**

<p>System change – build it <i>(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</i></p>	<ul style="list-style-type: none"> <li>▪ Access to the right equipment including PPE, supplies and an environment that facilitates decontamination of medical devices for patient and health worker safety.</li> </ul>
<p>Training and education – teach it <i>(to improve health worker knowledge)</i></p>	<ul style="list-style-type: none"> <li>▪ A program of routine training and education, periodic retraining competency assessment for all HCWs responsible for handling and reprocessing contaminated items that are in line with the recommendations presented in this section. Ensure all HCWs are trained in the theory and practice of decontamination. Ensure HCWs understand the associated risk and when personal protective equipment is required.</li> </ul>
<p>Monitoring and feedback – check it <i>(to assess the problem, drive appropriate change and document practice improvement)</i></p>	<ul style="list-style-type: none"> <li>• Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) related to sterilisation and medical devices decontamination</li> <li>• A program of regular supervision and feedback is in place.</li> </ul>
<p>Reminders and communication – sell it <i>(to promote the desired actions, at the right time, including campaigns)</i></p>	<ul style="list-style-type: none"> <li>▪ The practices described in the chapter are reinforced through awareness raising (e.g., use of posters displayed in the decontamination areas).</li> </ul>
<p>Culture and change – live it <i>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</i></p>	<ul style="list-style-type: none"> <li>▪ Managers and leaders at every level of the HCF show their visible support for decontamination to help develop and reinforce a culture of patient safety.</li> </ul>

## Chapter 7: Multi Drug Resistant (MDR) organisms & antimicrobial resistance (AMR)

### Relevant international and national guidance and tools

- WHO Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level <https://www.who.int/infection-prevention/publications/ipc-components-guidelines/en/>
- WHO Minimum Requirements for infection prevention and control (IPC) programmes <https://www.who.int/infection-prevention/publications/min-req-IPC-manual/en/>
- WHO Guidelines for the prevention and control of carbapenem-resistant Enterobacteriaceae, Acinetobacter baumannii and Pseudomonas aeruginosa in health care facilities <https://www.who.int/infection-prevention/publications/guidelines-cre/en/>
- WHO antimicrobial resistance e-learning module <https://ipc.ghelearning.org/>
- WHO Global Action Plan on antimicrobial resistance <https://www.who.int/antimicrobial-resistance/publications/global-action-plan/en/>
- WHO Five Moments AMR poster [https://www.who.int/gpsc/5may/D\\_AllMoments\\_A4\\_EN.pdf?ua=1](https://www.who.int/gpsc/5may/D_AllMoments_A4_EN.pdf?ua=1)
- WHO Information for Patients and Consumers. Hand hygiene and antibiotic resistance <https://www.who.int/gpsc/5may/patient-tips.pdf?ua=1>
- Government of Sierra Leone, National Strategic Plan for Combating Antimicrobial Resistance (2018-2022) [http://apps.who.int/datacol/answer\\_upload.asp?survey\\_id=666&view\\_id=722&question\\_id=13163&answer\\_id=19958&respondent\\_id=278587](http://apps.who.int/datacol/answer_upload.asp?survey_id=666&view_id=722&question_id=13163&answer_id=19958&respondent_id=278587)

### Key practice points:

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

### Introduction - why IPC is important for combatting AMR

- Normal microbial flora is protective. The administration of antibiotics kills off susceptible strains of normal bacteria and these are replaced with resistant strains, which are often resistant to many different classes of antibiotics. This replacement occurs most often in the gastrointestinal tract, which carries the bulk of bacteria, and results in stool carriage of multiple antibiotic resistant bacteria.
- Effective IPC is the cornerstone of actions to control AMR and the spread of multidrug-resistant pathogens. Specific threats posed by emerging infections due to CRE-CRAB-CRPsA (referred to here as CROs) require special attention and are covered later in this section. Infections with CROs are associated with high morbidity and mortality, as well as the potential to cause outbreaks and contribute to the spread of resistance.
- Of note within Sierra Leone a high prevalence rate of Extended-spectrum  $\beta$ -lactamase-producing organisms (Gram negative bacteria) has been reported within tertiary hospitals.
- Antimicrobial resistant organisms can easily spread from patient to patient in the hospital environment via the hands of staff, and contaminated equipment that is not decontaminated effectively.
- AMR threatens the effective prevention and treatment of infectious diseases by reducing the effectiveness of antimicrobial medicines. The misuse, including the over use, of antibiotics

increases the number of patients who are colonized or infected with resistant organisms in health care and in the community.

- As microbes become more resistant to common, inexpensive antimicrobials, there is a tendency to move on to more expensive and often multidrug treatment including the use of second- or third-line antimicrobial agents, increasing the cost of health care.
- AMR diminishes the therapeutic choices available to patients and healthcare providers. Other untoward effects of AMR include increased mortality rates, long hospital stays, admission to the intensive care unit and the spread of resistant microorganism to other patients.
- Some types of antimicrobial resistant organisms cause blood stream infections, ventilator associated pneumonia, urinary tract infections, IV infusion site infections, and surgical site and burn site infections.
- If introduced into high-risk units (e.g., ICU, burns) some AMR organisms are very difficult to eliminate.
- For these reasons AMR is considered a global public health threat and every country has committed to develop and implement plans to combat AMR.
- The Sierra Leone National Strategic Plan for Combating Antimicrobial Resistance (2018-2022) outlines the guiding principles and strategies for preventing AMR.
- Prevention of infection through effective IPC and WASH is at the heart of the strategic plan. IPC and WASH are cost effective and can be implemented in all settings to slow the development and restrict the spread of AMR.

### How and when to prevent AMR through IPC

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

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

- Triage and identification of patients (see chapter 8. Screening, triage and isolation: actions that support outbreak management and preparedness)
  - Identify on admission previously known positive patients with antibiotic-resistant bacteria
  - Identify “high-risk” patients using a triage risk assessment form
  - Flag the information in the patient’s notes (manually and/or via electronic record)
  - Patient isolation
    - After identification of patients during triage, isolate **known** patients.
    - In addition, isolate **suspected** patients and take appropriate screening swabs - keep under isolation until microbiological culture results are available
- Implementation of contact precautions (see chapter 4.1)
- Surveillance (see chapter 2) - of antibiotic-resistant bacteria should be undertaken in addition to monitoring of IPC practices. Outbreaks of CRPsA colonization/infection among patients has been found to be commonly associated with environmental CRPsA contamination involving water and waste-water systems, such as sinks and taps (faucets). Surveillance cultures of the environment for CRE-CRAB-CRPsA may be considered when epidemiologically indicated.
- Hand hygiene - perform timely and effective hand hygiene (see chapter 3.1)
- Cleaning and disinfection of environment, decontamination of items and equipment (see chapter 3.3)
  - One of the most important aims of cleaning in the context of some resistant organisms (i.e., CROs) is the prevention of biofilm formation.
  - Keeping relevant surfaces clean and dry will help to achieve this aim.
  - Special attention must be paid to handwash basins in clinical areas with the aim to keep these clean and dry.
  - Clinical handwash basins should not be used for other purposes.

- IPC education/training of all health care workers on prevention of AMR is important (see WHO e-learning modules).
- Targeted decolonization **for control of antibiotic resistant bacteria** (e.g., MRSA) can be effective in the short-term, helping to reduce bio burden and cross-infection in select populations. Body wash: E.g., use antiseptic solution, e.g., chlorhexidine gluconate (4%) daily for 5 days. Nasal ointment: E.g., use mupirocin (2) % nasal ointment twice daily for 5 days. Mupirocin resistance has been associated with widespread, prolonged use and its should initially be limited to 2 consecutive decolonization treatments.
- Minimum use of invasive devices is designed to minimize AMR development.

## Prevention of CROs

WHO recommend eight IPC measures to prevent the spread of CROs. These eight measures are listed in table 53.

**Table 53: Eight measures to prevent the spread of CROs**

Recommendation	How
1. Implementation of multimodal IPC strategies	<p>Strategies should consist of at least the following:</p> <ul style="list-style-type: none"> <li>• hand hygiene</li> <li>• surveillance (in particular, for CRE)</li> <li>• contact precautions</li> <li>• patient isolation (single room isolation or cohorting)</li> <li>• environmental cleaning</li> </ul>
2. Importance of hand hygiene compliance for the control of CRE-CRAB-CRPsA	<ul style="list-style-type: none"> <li>• hand hygiene best practices according to the WHO guidelines on hand hygiene in health care should be implemented</li> <li>• See chapter 3.1 Hand Hygiene</li> </ul>
3. Surveillance of CRE-CRAB-CRPsA infection and surveillance cultures for asymptomatic CRE colonization	<ul style="list-style-type: none"> <li>• a) surveillance of CRE-CRAB-CRPsA infection(s) should be performed; and b) surveillance cultures for asymptomatic CRE colonization should also be performed, guided by local epidemiology and risk assessment.</li> <li>• Populations to be considered for such surveillance include patients with previous CRE colonization, patient contacts of CRE colonized or infected patients and patients with a history of recent hospitalization in endemic</li> <li>• See chapter 2: Surveillance</li> </ul>
4. Contact precautions	<ul style="list-style-type: none"> <li>• contact precautions should be implemented when providing care for patients colonized or infected with CRE-CRAB-CRPsA</li> <li>• See chapter 4.1</li> </ul>
5. Patient isolation	<ul style="list-style-type: none"> <li>• patients colonized or infected with CRE-CRAB-CRPsA should be physically separated from non-colonized or non-infected patients using (a) single room isolation or (b) by cohorting patients with the same resistant pathogen</li> <li>• See chapter 8</li> </ul>
6. Environmental cleaning	<ul style="list-style-type: none"> <li>• Compliance with environmental cleaning protocols of the immediate surrounding area (that is, the “patient zone”) of patients colonized or infected with CRE-CRAB-CRPsA should be ensured.</li> <li>• See chapter 3.3</li> </ul>
7. Surveillance cultures of the environment for CRE-CRAB-CRPsA colonization/contamination	<ul style="list-style-type: none"> <li>• surveillance cultures of the environment for CRE-CRAB-CRPsA may be considered when epidemiologically indicated.</li> <li>• See chapter 2</li> </ul>
8. Monitoring, auditing and feedback	<ul style="list-style-type: none"> <li>• monitoring, auditing of the implementation of multimodal strategies and feedback of results to health care workers and decision-makers.</li> <li>• See table below: multimodal considerations for AMR prevention and control</li> </ul>

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

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

## Additional considerations

- IPC is one component of an effective strategy to combat AMR. Promoting the appropriate use of antimicrobials through a multidisciplinary antimicrobial stewardship programme will reduce morbidity, mortality and the economic burden of AMR. The IPC measures listed here should be implemented in partnership with the work of the AMR stewardship committee.

**Table 54: Approach to using a multimodal strategy to combat AMR through IPC**

System change – build it <i>(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</i>	<ul style="list-style-type: none"> <li>▪ Put in place/maintain SOPs that support control of MDROs and identify additional budget needed to support IPC and antimicrobial stewardship efforts</li> </ul>
Training and education – teach it <i>(to improve health worker knowledge)</i>	<ul style="list-style-type: none"> <li>▪ Include AMR within IPC &amp; WASH in-service training - use online WHO courses/e-learning – focus on standard &amp; transmission-based precautions, hand hygiene, WASH</li> </ul>
Monitoring and feedback – check it <i>(to assess the problem, drive appropriate change and document practice improvement)</i>	<ul style="list-style-type: none"> <li>• Perform AMR surveillance and monitoring to guide IPC interventions (at least quarterly) and to help detect outbreaks and perform timely feedback of results to HCWs and stakeholders and through national networks. This could include monitoring of consumption/usage of antimicrobial agents.</li> </ul>
Reminders and communication – sell it <i>(to promote the desired actions, at the right time, including campaigns)</i>	<ul style="list-style-type: none"> <li>• Increase awareness on the role of IPC and WASH in AMR prevention through communication strategies, messages and materials to promote AMR awareness e.g., through support for annual antibiotic awareness week campaigns</li> <li>• Use of alert sticker on the front of patient's notes &amp; name of microorganisms inside the patient's notes to prevent breach of confidentiality</li> </ul>
Culture and change – live it <i>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</i>	<ul style="list-style-type: none"> <li>▪ Create an environment that facilitates and role MDRO management.</li> <li>▪ Use champions/IPC link nurses and role models to raise awareness to actions to prevent MDROs.</li> </ul>

## Chapter 8: Screening, triage and isolation: actions that support outbreak management and preparedness

### Relevant international and national guidance and tools

- WHO International health regulations 2005 <https://www.who.int/publications/i/item/9789241580496>
- Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings (2007) <https://www.cdc.gov/infectioncontrol/guidelines/isolation/index.html>
- WHO Outbreak investigation e-learning module <https://ipc.ghelearning.org/>

### Key practice points:

- Perform screening as a priority process that must be done prior to entering a health facility.
- Align relevant questions and process algorithms with National protocols or contextualized to the outbreak or disease at risk.
- Provide clear pathways for all staff to follow.
- Implement IPC measures on arrival and rapidly for anyone presenting with potentially communicable diseases.
- Identify isolation facilities. These should be marked and based on the diseases route of transmission.
- For patients that cannot be safely managed in isolation, make an appropriate referral with clear notification of the communicable diseases of concern.
- After any positive screen and/or test of a communicable disease, undertake the appropriate follow up of potentially exposed staff or patients to national and subnational protocols initiated by the IPC focal point and/or occupational health specialist.
- Focus on a combination of a supportive infrastructure, the use of reminders (e.g., posters), training and education (consistent with guideline content), monitoring and evaluation (using a valid and reliable approach) and a safety culture, to make it more likely that triage will be applied in the right way at the right times.

### Introduction - why screening, triage and isolation are important

This chapter aims to assist HCFs in developing or updating their protocols for screening, triage and isolation for communicable diseases of urgent public health concern (i.e., Ebola virus disease, COVID-19, etc.).

Screening, triage and isolation are important IPC interventions that:

1. Enhance early recognition of a patient who may have a communicable disease of urgent public health concern upon arrival at the hospital ED (Emergency Department) or clinic through effective screening;
2. Prompt the rapid implementation of IPC measures to minimize potential transmission to staff, patients and visitors.
3. Provide a template from which hospitals may operationalize their plans. Including the identification and management of exposed persons in ED/Clinics.

### How and when to screen, triage and isolate

MOHS recommends that each health facility convene a working group composed of staff from key health facility departments to review and sign off on the finalized hospital screening/isolation protocols. Suggested members for the health facility working group should include: ED, IPC/ Infectious Disease, hospital administration, security, housekeeping, and/or facility engineering.

Health facilities are encouraged to use standard terminology and approaches that are consistent with recommendations by MoHS and IPC national Unit (NIPCU).

## Screening

Effective screening and isolation of potentially infectious patients is critical to ensure prompt recognition and isolation as soon as possible upon patient arrival. The following measures are recommended to be routinely in place to help decrease transmission of infectious agents to staff, visitors and other patients:

*(Note: Below should be considered standard measures for all EDs and clinic to routinely have in place.)*

- Hand hygiene stations (ABHR or soap and water) at all facility entrances. See hand hygiene chapter for more information on requirements and considerations for implementation
- Medical masks and/or tissues for patients to wear when presenting with respiratory like illness. These measures are part of proper respiratory hygiene and source control measures.
- Signage (see below) for patients and visitors indicating signs and symptoms for diseases of concern, explanations for how to protect themselves (i.e., wearing masks, cough etiquette, performing hand hygiene, etc.) and indication for organizing patient flow. Ideally signage should be in local languages and using visuals to assist all patients and visitors.
- Other supplies: boxes of tissues, wastebaskets/bin, and alcohol-based hand hygiene products should be placed throughout the ED/clinic waiting areas and examination rooms.
- Access to PPE for all staff performing screening at the first point of contact.
- Posters or algorithms posted for screening staff to serve as reminders for updated screening questions and appropriate actions to take for any potential cases.

A **positive communicable disease triage screen** is considered for any patient who meets ministry defined criteria or national case definitions. For more information, refer to the IDSR guidelines 2020 and recommendations as indicated per specific communicable disease of public health concern.

Health facilities may consider any of the following methods to help prompt staff to routinely use this communicable disease triage screening tool:

- 1) A poster or desk chart that is placed in a location that is easily seen by the triage or registration staff.
- 2) Including the communicable disease triage screening questions on all paper-based registration or triage forms, or a sticker that is placed on all forms for patients who report fever.
- 3) In healthcare facilities with computerized ED or clinic registration systems, adding a computer prompt that asks all patients about fever symptoms. For patients that report fever, the communicable disease triage screening tool will automatically pop-up on the computer screen.

## IPC measures on arrival

- **Standard and transmission-based precautions:** When a patient with a suspected or positive communicable disease triage screen is identified, prompt implementation of standard precautions (see chapter 3) including respiratory hygiene/cough etiquette, and appropriate TBPs (chapter 4) and isolation where appropriate, based on the suspected infection, will decrease the risk of transmission to others.
  - At a minimum, droplet and contact precautions should be used for all patients with a positive communicable disease triage screen.
- **Communication:** once triage has identified a patient with a positive communicable disease screen, prompt notification of appropriate staff should be instituted to ensure rapid evaluation of



the patient for a potentially communicable disease of urgent public health concern. It is crucial to identify key staff ahead of time to ensure notification occurs rapidly.

- **Physical separation** of patients from others in an isolation room or in the waiting area should take place pending medical evaluation. Depending on the space and available resources in the hospital emergency department or clinic, isolation options in decreasing order of preference include:
  - **Airborne Infection Isolation Room (AIIR):** negative pressure isolation rooms with a minimum of 6-12 air exchanges per hour and direct exhaust to the outside. (Note: These rooms should be tested by Facility maintenance officer beforehand to ensure that the rooms are exhausted appropriately (i.e., not positive pressure and do not share airflow with other rooms.)
  - a. **Pre-identified enclosed private room(s):** an examination room with a door that is kept closed to the hallway. (Self-closing doors are preferable) or well-ventilated room allowing for proper airflow.
  - b. **Pre-identified examination area,** even if not individual rooms, to cohort patients with similar symptoms. Patients should be separated from each other by at least 1-2 metres (more if possible).
  - c. **A space dedicated outside or away from waiting areas** until a more appropriate space can be identified.
- **COVID-19:** Special considerations in the context of COVID-19 - see Figure 9 for a sample approach on screening, triage and isolation in response to COVID-19.

**Table 55: Sample screening, triage and isolation recommendations for COVID-19**

<b>Screening and triage for early recognition of patients with suspected COVID-19:</b>
<ul style="list-style-type: none"> <li>• display information at the entrance of the facility directing patients with signs and symptoms of COVID-19 to report to the designated area for screening;</li> <li>• establish entrances for patients with signs and symptoms of COVID-19;</li> <li>• train staff on the signs and symptoms of COVID-19 and the most recent case definitions</li> <li>• encourage health workers to be alert to potential COVID-19 infection in all patients;</li> <li>• establish well-equipped screening and triage stations, where screening questionnaires are used according to the most recent WHO case definitions, and where staff have access to adequate supplies of personal protective equipment (PPE), based on WHO’s rational use of PPE guidance;</li> <li>• ensure that screening personnel maintain a distance of at least 1 metre from patients, ideally with a separation created by a glass/plastic screen. If that is not possible, mask and eye protection should be worn;</li> <li>• use a screening algorithm to promptly identify and direct patients with suspected COVID-19 to an isolation room or dedicated COVID-19 waiting area; all suspected COVID-19 patients should wear masks for source control purposes and be positioned at least 1 metre apart from each other in a designated, well-ventilated, waiting area;</li> <li>• ensure that a process is in place to reduce the amount of time suspected COVID-19 patients wait to be screened;</li> <li>• after screening and isolation, triage patients using standardized and validated triage tools (e.g., WHO/ICRC/MSF/IFRC Integrated Interagency Triage Tool) to identify those in need of immediate care and those that can safely wait. Refer to WHO’s clinical management of COVID-19 interim guidance.</li> <li>• suspected COVID-19 patients with symptoms of respiratory distress and severe underlying conditions should be prioritized for medical evaluation.</li> </ul>
<b>Isolation or designated waiting area and rapid implementation of source control measures:</b>
<ul style="list-style-type: none"> <li>• Health care facilities without enough single isolation rooms in emergency departments should designate a separate, well-ventilated area where patients with suspected COVID-19 can wait. This area should have benches, stalls or chairs placed at least 1 metre apart;</li> <li>• the isolation or designated area should have dedicated toilets, hand hygiene stations, and trash bins with lid for disposal of paper tissues used for respiratory hygiene or after hand washing;</li> <li>• display graphic information for patients to show them how to perform hand and respiratory hygiene.</li> </ul>

Source: Infection prevention and control during health care when coronavirus disease (COVID-19) is suspected or confirmed: Interim guidance. Geneva: World Health Organization; 2020 (available at: <https://www.who.int/publications/i/item/WHO-2019-nCoV-IPC-2020.4>)

- **Signage:** if patients are placed in an isolation room, appropriate infection control signage based upon the route of transmission for the suspected disease of concern and/or Health facilities IPC policies should be posted outside the patient's isolation room signifying the need for precautions until a medical evaluation determines that the patient does not have a contagious disease requiring isolation.
- **Documentation.** Once a patient has been placed in an isolation room, the dedicated nurse should document the time that the patient was placed in the room, as well as the type of infection control precautions implemented (e.g., airborne, contact) on the patient's record.
- **PPE.** The management of PPE disposal should be consistent with the national IPC policies (see chapter 3.2 PPE and chapter 3.6, waste management for more details).

**Isolation - general considerations for implementing isolation include:**

- **PPE (see chapter 3.2).**
  - All appropriate PPE should be stocked outside the door to the patient's isolation room for easy access and use.
  - PPE should be put on before entering the room and removed before leaving the patient area.
  - Posters/reminders on the proper method of donning and removing PPE should be prominently displayed outside or nearby all isolation rooms in the ED and clinics.
- **Hand hygiene (see chapter 3.1)**
  - Hand hygiene stations (ABHR or water and soap) should be available to enable hand hygiene practices
- **Waste (see chapter 3.6).**
  - A separate waste receptacle/bin should be placed immediately outside the patient's room for disposal of PPE and other health care waste generated.
- **Traffic.**
  - Limit as much as possible the number of persons who enter the patient's room, as well as the traffic in and out.
  - Entry should be limited to necessary health facility staff and public health personnel.
  - Visiting by family members should consider patient, visitor and health worker safety including compassionate care needs.
- **Equipment (chapter 6).**
  - As much as possible dedicate patient care equipment (e.g., blood pressure cuffs and stethoscopes) or use single-use equipment.
  - If equipment must be used on other patients (e.g., portable X-ray machine), meticulously clean and disinfect the equipment between uses.
- **Laundry and linen (chapter 3.4).**
  - All used laundry and linen should be handled carefully and disposed of according to the indicated national protocols (see Linen and laundry management section for more details).

**Isolation, management and referral**

- Following lessons learnt from the EVD outbreaks, the Ministry of Health endorsed standardized triage and isolation units (previously also known as "UNOPS" structures) at referral health care facilities (mainly hospitals). These structures are used to promptly screen, isolate, treat and, when required, refer cases of priority infectious diseases to regional specialized isolation units.
- In alignment with the 3<sup>rd</sup> Edition IDSR guidelines 2020 epidemic prone diseases (see Table 38) all suspected infectious patients will immediately be isolated and management initiated at the presenting facility.

**Table 56: List of suspected infectious agents for immediate isolation**

	<b>Disease</b>
1	Acute bloody diarrhoea (Shigella)
2	Cholera (severe acute watery diarrhoea)
3	Human influenza
4	Monkey pox
5	Measles
6	Meningitis (bacterial)
7	Pertussis (whooping cough)
8	SARS (severe acute respiratory syndrome)
9	Viral Haemorrhagic Fevers (includes Lassa, Ebola, Marburg, CCHF)
10	Other PHEIC (public health event of international concern; includes zoonotic, foodborne, chemical, radio nuclear, or due to unknown conditions)

**Identification and Management of Exposed Persons in the ED/clinic:**

- As soon as it is determined that a patient has a suspected or confirmed communicable disease of urgent public health concern, it will be essential to identify all contacts (including other patients and visitors in the waiting area during the time the patient was there). This should be done in coordination with the MoHS and respective national protocols.
- If not already done, the IPC focal person or his/her designee should notify the MoHS or facility surveillance officer.
- Determination of the need for identification, monitoring and preventive care for potential contacts will be based on the epidemiology and clinical aspects of the suspected or confirmed communicable disease and its probable mode of transmission.
- The following measures may need to be taken after consultation with the surveillance officer regarding the risk of transmission to contacts in the health facility.
  - The IPC focal person and the health Facility surveillance officer will create a line list of patients and staff who were exposed to the index case prior to the index case being placed in isolation.
  - The line list should include the following information on all contacts: full name, address, telephone contacts (home, work, cell, email) and description of type of contact (e.g., shared waiting room). If the infectious agent involves a vaccine preventable agent (e.g., measles, chickenpox), a column on the line list should include the vaccine status for the agent of concern.
  - Consistent with your hospital's policy, the number of persons who enter the patient's room should be limited, as well as the traffic in and out. Entry should be limited to necessary hospital staff and public health personnel. Visitors should be excluded from entering the patient's room.
  - A log should be kept to track the names and contact information for all persons who enter the room, in the event that follow up is needed.
  - Individuals who accompanied the patient to the hospital should be quickly evaluated for signs/symptoms, counselled, asked for contact information, and asked to stay in case further evaluation confirms a communicable disease of urgent public health concern.
  - For certain suspected communicable diseases of urgent public health concern, such as smallpox, during the initial consultation with the IHR focal point/ MOHS, MOHS may request that the health facility detain the contacts in the hospital until the relevant Rapid response team MOHS personnel arrive to interview them. A detention order may be issued, if needed, for non-compliant contacts:
    - A location in the hospital should be pre-identified that can be used to hold all ED or clinic contacts that are awaiting evaluation by MoHS.
    - IPC focal person or Mental Health personnel should be available to explain the situation to contacts. If possible, patient-appropriate literature on the infectious agent of concern should be made available to all contacts.

- For contacts that refuse to stay, the IPC staff should collect information on how to reach the person (including address and home, work and cell phones or beepers). Inform the contact that MoHS will be getting in contact with them and it is extremely important that they respond.
- MoHS may issue a Commissioner’s Order that permits the hospital to prevent the contact or suspected contact from leaving.

### Considerations in facilities with limited resources

- MoHS recognizes that there are limitations to the recommendations contained throughout this chapter that may make it difficult to implement routinely. Factors that may limit the ability to adhere to this guidance include:
  - Rainy season: when larger numbers of patients present with fever and/or respiratory symptoms or nonspecific, prodromal symptoms of communicable diseases.
  - Hospital surge capacity: in handling larger numbers of potentially contagious patients (e.g., limited airborne infection isolation rooms, or small waiting rooms that do not easily allow hospitals or clinics to separate patients with fever and cough).
- However, given the potential implications of delayed recognition of a patient with a more highly communicable disease, this guidance document provides a standardized format for hospitals to use for their screening and triage protocols for infectious diseases in their ED, clinics or wherever their first point of contact with a patient may take place.
- Regular trainings and drills for frontline health workers (triage, reception, security as well as nursing and medical staff) on the measures outlined in this protocol, including notification procedures, are essential to ensure compliance with these measures.

### Additional Considerations

There are numerous levels of isolation capacity within Sierra Leone, and patients are managed accordingly:

- For suspected cases presenting at Peripheral Health Units, they will be screened, promptly isolated, and specimens taken where feasible, management initiated and then referred to the district hospital for ongoing management
- For suspected cases presenting at **the district hospital** with triage and isolation units, patients will be screened at triage, and then admitted to the isolation room within the triage unit, where they will be managed until a laboratory confirmation is available or clinical diagnosis is made; pending results and the local capacity the case will continue to be managed at the triage and isolation unit, admitted to a ward at the same hospital, referred to a regional isolation centre or discharged.
- Suspect and/or confirmed cases will be referred from the clinics, health centres or hospital to **regional isolation units** for further management until patient discharge. In general, regional isolation units will not receive patients directly from the community.

**Table 57: Approach to using a multimodal strategy for screening, triage and isolation**

<p>System change – build it <i>(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</i></p>	<ul style="list-style-type: none"> <li>• Put in place/improve the necessary infrastructure and resources to enable measures to effectively implement national and subnational screening, triage and isolation protocols (e.g., thermometers, screening space at entrance to health facility, PPE, etc.). Good infrastructure and available resources can streamline interventions for consistent care and make implementation easier and safer.</li> <li>• Make available easy access to guidelines, policies and procedures for staff.</li> </ul>
<p>Training and education – teach it <i>(to improve health worker knowledge)</i></p>	<ul style="list-style-type: none"> <li>• Provide a reliable system for practical training and education methods that are aligned with the recommendations for screening, triage and isolation.</li> <li>• Use onsite courses, simulations and videos, group discussions, bedside training, e-learning, etc. to help reinforce proper adherence to facility protocols.</li> </ul>
<p>Monitoring and feedback – check it <i>(to assess the problem, drive appropriate change and document practice improvement)</i></p>	<ul style="list-style-type: none"> <li>• Put in place/improve regular IPC assessments by IPC focal person, including monitoring, reporting and feedback mechanism (including roles and responsibilities) to monitor compliance with screening, triage and isolation measures as a key process indicator. Evaluate regularly and report results in a timely manner.</li> </ul>
<p>Reminders and communication – sell it <i>(to promote the desired actions, at the right time, including campaigns)</i></p>	<ul style="list-style-type: none"> <li>• Use visual protocols or algorithms detailing proper pathways for screening and isolation. In addition, use posters to act as reminders for daily review, posters addressing hand hygiene, brochures, organizational charts, infographics as appropriate</li> <li>• Communicate with patients and their visitors about the need for IPC measures on arrival and explain what will take place during the screening, triage and isolation process as required.</li> </ul>
<p>Culture and change – live it <i>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</i></p>	<ul style="list-style-type: none"> <li>• Create an environment and perceptions that facilitate awareness of screening, triage and isolation. Nurture a climate that understands and prioritizes safety and IPC issues. The culture of a hospital influences how teams work together and how valued people feel – and how they perform day to day. It can influence staff perceptions of their ability to make a change – e.g., to safer, evidence-based practices</li> <li>• Clinical leads should act as role models. Managers should ensure budgets are made available for necessary equipment and supplies including hand hygiene materials and support quality improvement.</li> </ul>

## Chapter 9: Healthcare worker protection and safety

### Relevant international and national guidance and tools

- WHO–ILO Global Framework for National Occupational Health Programmes for Health Workers (2020) <https://www.who.int/news/item/10-06-2020-who-ilo-global-framework-for-national-occupational-health-programmes-for-health-workers>
- WHO Infection prevention and control during health care when coronavirus disease (COVID-19) is suspected or confirmed <https://www.who.int/publications/i/item/WHO-2019-nCoV-IPC-2020.4>
- WHO Risk assessment and management of exposure of health care workers in the context of COVID-19 Interim guidance <https://apps.who.int/iris/handle/10665/331496>
- WHO Post-exposure prophylaxis Factsheet [https://www.who.int/hiv/topics/prophylaxis/pep\\_factsheet\\_dec2014.pdf](https://www.who.int/hiv/topics/prophylaxis/pep_factsheet_dec2014.pdf)
- IPC for Novel Coronavirus [COVID-19] Course. Geneva; World Health Organization 2020 <https://openwho.org/courses/COVID-19-IPC-EN>

### Key practice points:

- Put in place mitigations to minimise and in many cases remove risks to health care workers from a range of infectious agents during their day-to-day work.
- Chief mitigations include adherence to standard and transmission-based precautions (chapter 3 and 4 respectively), including timely and effective hand hygiene (chapter 3.1) and the appropriate use of PPE (chapter 3.2).
- Promptly notify when exposure to an infectious agent has occurred and take action to minimise harm.
- Provide post exposure prophylaxis programmes to protect health workers from harmful blood borne pathogens – ensure administration in a timely manner.
- Manage exclusion of health workers with or exposed to certain infectious agents to further protect patients and fellow health workers.
- Focus on a combination of a supportive infrastructure, the use of reminders (e.g., posters), training and education (consistent with guideline content), monitoring and evaluation (using a valid and reliable approach) and a safety culture, to make it more likely that health worker protection will happen.

### Introduction - why IPC is important for health worker protection and safety

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

- Protection of health care workers can be supported through an effective IPC programme, development and implementation of IPC guidelines and close working between IPC and Occupational Health teams. IPC is one aspect of occupational health.
- Blood borne viruses (HIV, HBV, HCV) present a special concern. Occupational exposure to HIV presents a low but measurable risk of infection to HCWs globally. It is estimated that through occupational exposure, 2.6% of HCWs are exposed to HCV, 5.9% to HBV and 0.5% to HIV annually. The risk of conversion to HIV infection following a percutaneous injury has been estimated to be 0.3% and that following a mucosal exposure to be 0.09%. The risk of transmitting HBV and HCV is higher than the risk of transmitting HIV in most cases of exposure, especially in the health-care setting.
- HBV infection is a well-recognized occupational risk for HCWs and can be transmitted via exposure to body fluids. In addition to percutaneous injury, contact of mucous membranes or non-intact skin with blood, fluids containing blood, tissue or other potentially infectious bodily fluids pose an infectious risk. HBV is highly infectious, can be transmitted in the absence of visible blood, and may remain infectious on environmental surfaces for up to 7 days. It is well established that the sero-conversion after needle stick or sharp injuries contaminated with an infected source is 10–30% for HBV.
- Blood from persons with HBV infection contains the highest HBV titres of all body fluids and is the most important vehicle of transmission in the health-care setting. The following body fluids also are considered potentially infectious: cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, and amniotic fluid. Studies have documented HBV in saliva and tears. These body fluids have generally not represented an occupational risk for HBV infection unless they contain blood. Although, semen and vaginal secretions have been implicated in the sexual transmission of HBV, they have not been implicated in occupational transmission from patients to HCWs. The presence of hepatitis B surface antigen (HBsAg), usually an indicator of active HBV infection, also is found in other body fluids (e.g., breast milk, bile, faeces, nasopharyngeal washings, and sweat). Most body fluids are not efficient vehicles of transmission (unless they contain blood) because they contain low quantities of infectious HBV. Sputum, urine, and vomitus are not considered potentially infectious unless they contain blood.
- A safe working environment contributes to health care worker well-being and retention, increased productivity and economic best outcomes.
- Risks and hazards are fluid and need monitoring and adjustments made to the appropriate safety plans and processes.

### How and when to ensure health worker protection

- **Responsibility of the health care facility** - employers have a responsibility to ensure a healthy and safe working environment for all employees. This includes:
  - Making relevant SOPs available to staff, based on evidence-based guidelines
  - Providing staff with appropriate orientation, training and supervision on safety procedures
  - Assessing and managing identified risks (e.g., investigate accidents and illnesses)
  - Documenting and reporting staff injury or illness.
  - Having a process for worker feedback on safety issues.
  - Demonstrably supporting IPC best practices for HCW safety.
  - Implementing vaccination of HCWs (see table 58: vaccination of HCWs)
  - Implementing PEP including counselling and follow up.
- This section focuses on health worker protection in the context of infectious or biological hazards. Occupational exposure to such hazards is usually avoidable if certain IPC-related measures are implemented.
- WHO guidance highlights the importance of guidelines on Health care worker protection and safety within health care facilities and that such guidance should address: aspects of improving working conditions, detection of occupational diseases, health surveillance of

workers, pre-employment screening and vaccinations and in addition the importance of routine communications between IPC and Occupational Health Programmes (where they exist).

- See also chapter 3, Standard Precautions and especially chapter 3.7 management of sharps injuries and chapter 4, transmission-based precautions
- The key measures to protect health workers and keep them safe are highlighted in box 2.

#### Box 2. key measures to protect health workers

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

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

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

- Should follow safe work practices at all times, including being familiar with relevant SOPs.
- Should adhere to Standard Precautions (chapter 3) and Transmission-Based Precautions (chapter 4).
- Know the potential health and safety hazards of the job and protective measures by participating in appropriate occupational health and safety training programs.
- Use PPE (chapter 3.2) as trained and report any changes in personal medical condition that would require a change in status as to wearing PPE.
- Know how to report unsafe working conditions. Report any work-related injury or illness to supervisor and adhere to the exclusion policy.
- Participate in accident and injury investigations.
- Know what to do in an emergency.
- Participate in health and safety committees (when available) can be an important way to improve conditions on the job such as:
- Provide a forum for employees and management to work together to solve health and safety problems.
- Help prevent injury and illness on the job i.e., conduct regular walk-a-round inspections to identify potential health and safety hazards.
- Increase awareness of health and safety issues among employees, supervisors, and managers i.e., analyse injury data, accident reports and report trends.
- Develop strategies to make the work environment safe and healthy.

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

- When personnel are initially appointed or are reassigned to different jobs or areas, a pre-placement evaluation can be used to ensure that persons are not placed in jobs that would pose undue risk of infection to them, other personnel, patients, or visitors.



- A health inventory is an important part of this evaluation. This inventory can include:
  - Determining a health worker’s immunization status, and obtaining a history of any conditions that may predispose the health worker to acquire or transmit infectious diseases such as:
    - Chickenpox (varicella).
    - Measles (rubeola).
    - History of exposure to or treatment for tuberculosis (TB).
    - History of hepatitis.
    - Dermatologic conditions.
    - Chronic draining infections or open wounds.
    - Conditions with immunodeficiency such as HIV.
- Susceptible workers, including pregnant women, should not care for patients with chickenpox, herpes zoster (shingles), Rubella, or Measles (rubeola). Re-assignment of a pregnant employee is indicated if a patient has parvovirus B19 or receiving Ribavirin in aerosol
- Physical examinations may be useful to detect conditions that may increase the likelihood of transmitting disease to patients, or unusual susceptibility to infection, and to serve as a baseline for determining whether any future problems are work-related.
- Physical examination may also include baseline vital signs, hearing and visual screening.
- **Vaccination**
  - Since hospital personnel are at risk of exposure to and possible transmission of vaccine-preventable diseases because of their contact with patients or material from patients with infections, maintenance of immunity is an essential part of a hospital’s occupational health and Infection Prevention and Control program.
  - Optimal use of immunizing agents will serve to safeguard the health of personnel and also protect patients from becoming infected by personnel.
  - Following a consistent program of immunizations could eliminate the problem of susceptible personnel and avoid unnecessary activity restrictions.
  - Immunizations should be free of charge and at least include the followings:
    - Hepatitis B vaccine (for **HCWs whose occupational tasks place them at risk of exposure to blood or other potentially infectious material**).
    - MMR (Measles, mumps, rubella).
    - Influenza (flu).
    - Chickenpox (varicella).
    - TDP (Tetanus, Diphtheria, Pertussis).
    - Meningococcal Meningitis.

**Table 58: Vaccination of HCWs**

Vaccines	Recommendations
Hepatitis B Vaccine	If you don't have documented evidence of a complete blood test that shows you are immune to hepatitis B (i.e., no serologic evidence of immunity or prior vaccination) then you should: <ul style="list-style-type: none"> <li>• Get the 3-dose series (dose #1 now, #2 in 1 month, #3 approximately 5 months after#2).</li> <li>• Get anti-HBs serologic tested 1–2 months after dose #3.</li> </ul>
Flu (Influenza)	Get 1 dose of influenza vaccine annually.
Varicella (Chickenpox)	If you have not had chickenpox (varicella), if you haven't had varicella vaccine, or if you don't have an up-to-date blood test that shows you are immunized to varicella (i.e., no serologic evidence of immunity or prior vaccination) get 2 doses of varicella vaccine, 4 weeks apart.
Tdap (Tetanus, Diphtheria, Pertussis,	<ul style="list-style-type: none"> <li>• Get a one-time dose of Tdap as soon as possible if you have not received Tdap previously (regardless of when previous dose of Td was received).</li> <li>• Get Td boosters every 10 years thereafter.</li> <li>• Pregnant HCWs need to get a dose of Tdap during each pregnancy.</li> </ul>

Vaccines	Recommendations
Meningococcal	Those who are routinely exposed to isolates of <i>N. meningitidis</i> should get one dose.
Healthcare workers include physicians, nurses, emergency medical personnel, dental professionals and students, medical and nursing students, laboratory technicians, pharmacists, hospital volunteers, and administrative staff.	

### Health counselling

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

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

- Major functions of the HCW employee health service include arranging for prompt diagnosis, management of job-related injuries/ illnesses, providing prophylaxis for certain preventable diseases to which personnel may be exposed and maintaining confidential health records. A job-related illness is one that develops as a direct consequence of work undertaken at the place of employment although it might only present outside the workplace environment.
- In the event of a job-related injury the injured party should follow facility guidelines when obtaining first aid (as needed), notifying the supervisor immediately. The incident should be documented at the time along with measures taken to mitigate risk. Follow up with occupational health regarding the incident should be as soon as feasible and definitely within 72 hours. If susceptible personnel contract a serious infection that is potentially transmissible or are exposed to an illness that leads to a period during which infection may be spread, the hospital's responsibility to prevent the spread of infection to patients and other personnel may sometimes require that these persons be restricted from direct patient contact.
- All healthcare facilities should institute engineering and work practice controls whenever possible to eliminate or minimize employees' exposure to blood, body fluids, and other potentially infectious materials. Most exposures are preventable.

### Managing Sharps injuries

- See chapter 3, Standard Precautions and specifically 3.7 Prevention of sharps injuries.

### Post Exposure Prophylaxis

See table 59 for a summary of PEP in relation to HIV, Hep B and Hep C.

**Table 59: Summary of PEP**

<b>General points</b>	<ul style="list-style-type: none"> <li>• Health care workers should have immediate access to PEP, 24 hours a day, 7 days a week to be freely dispensed by any hospital (private or public), regardless of the location or type of work they do.</li> <li>• If PEP is being considered, the exposed person must be risk assessed and counselled.</li> <li>• Following counselling and advice, the exposed worker may, in the absence of any contraindication decide to start PEP as outlined below.</li> </ul>
<b>What is PEP?</b>	<ul style="list-style-type: none"> <li>• PEP is generally understood to mean the medical response given to prevent the transmission of a blood borne virus following a potential exposure.</li> </ul>

	<ul style="list-style-type: none"> <li>○ <b>Hepatitis B:</b> As per local guidelines, discuss with the local expert who will assess the immune status for HBV infection and will take appropriate action. Based on the assessment, Hepatitis B vaccine +/- Hepatitis B immunoglobulin can be given</li> <li>○ <b>Hepatitis C virus:</b> Currently no vaccine is effective in the prevention of HCV transmission. However, treatment of acute hepatitis C infection is known to be highly effective. Please refer to the local expert for assessment, testing and treatment as per the local guidelines.</li> <li>○ <b>HIV:</b> Urgent action is required. HIV PEP consists of a 28-day course of anti-retroviral. If indicated, the PEP should be started as soon as possible, ideally within one hour of exposure or within 72 hours' post-exposure. The HCF should keep starter packs usually in the pharmacy and this consists of a 3 to 5-day starter pack of anti-retroviral therapy. If PEP is started, first aid, risk assessment, counselling, review of the test result and monitoring of treatment is essential by local infectious disease personnel. Appropriate support and follow up is important.</li> </ul>
<b>Goals of PEP</b>	<ul style="list-style-type: none"> <li>● Maximal and durable suppression of replication of HIV, HBV and HCV;</li> <li>● Preservation of immune function;</li> <li>● Reduction of HIV, HBV and HCV related morbidity and mortality; and improvement of quality of life</li> </ul>
<b>The source &amp; exposed persons</b>	<ul style="list-style-type: none"> <li>● The exposed person is the person who has been potentially at risk of acquiring the infection through exposure to blood or body fluids in his or her occupational or in another non-occupational situation (Idem).</li> <li>● The source person is the person who is (either identified or not identified as) the possible source of contamination through potentially infectious blood or body fluids. If the sero-status of the source person is unknown, he or she may be asked to provide informed consent to HIV, HBV, HCV testing. The source person may be a patient if a health care worker is exposed</li> </ul>
<b>Main types of exposure considered for PEP</b>	<ul style="list-style-type: none"> <li>● Needle-stick injury or injury with a sharp object used on a patient.</li> <li>● Mucosal exposure of the mouth or eyes by splashing fluids.</li> <li>● Human bite.</li> <li>● Broken skin exposed to a small volume of blood or secretions.</li> </ul>
<b>Components of the PEP programme</b>	<ul style="list-style-type: none"> <li>● A hospital's occupational post-exposure management program should encourage prompt reporting, assessment, evaluation, counselling, and provision of prophylactic medication and follow-up.</li> <li>● A PEP Programme should provide educational programs for HCWs that emphasize the importance of implementing standard precautions (SP). It should also instruct HCWs how to proceed in the event of an occupational exposure potentially involving a blood-borne pathogens (BBP).</li> <li>● The comprehensive package of PEP services offered depends on the setting and context in which the exposure occurs. A code of practice, protocols and standard operating procedures for PEP services need to be formulated as part of the process of developing policy. <ul style="list-style-type: none"> <li>○ Wash hands and other skin surfaces that become contaminated with blood or other potentially infectious materials immediately and thoroughly with soap and clean running water.</li> <li>○ Thoroughly wash (flush) with water mucous membranes that become contaminated.</li> <li>○ Prohibit HCWs with open wounds or weeping skin rashes from all direct patient-care, potentially hazardous laboratory procedures, and handling patient-care equipment until recovery</li> <li>○ Cuts or abrasions should be protected with a waterproof dressing and gloves prior to performing any procedure that involves contact with blood and other potential body fluids.</li> <li>○ Record and monitor exposures to blood and body fluids.</li> <li>○ Monitor infectious material</li> <li>○ Adequately staff healthcare facilities.</li> <li>○ Provide information and training.</li> <li>○ Maintain surveillance of work practices.</li> </ul> </li> </ul>

<b>Key implementation points</b>	<ul style="list-style-type: none"> <li>• Effective implementation requires thorough assessment of exposed individual and source (where possible) and the transmission risk for infection of exposure, clinical and laboratory follow-up and the provision of information, education and support.</li> <li>• For HIV - it has been shown that administration of ARVs within 72 hours of exposure reduces the likelihood of HIV infection being transmitted in persons who have been accidentally exposed to HIV through needle-stick inoculation or through contamination of mucous membranes by secretions.</li> <li>• The ARVs needs to be continued for one month. The following guidelines should be followed in the event of accidental occupational exposure to material (i.e., blood, secretions, and excretions) that may contain HIV.</li> </ul>
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### Eligibility for HIV PEP

Assess the following to evaluate eligibility for HIV PEP:

- The timing of the potential exposure.
- The HIV status of the person exposed.
- The nature and risk of the exposure (i.e., needle stick injury, mucous membrane exposure or intact skin exposure) see table 56.
- The HIV status of the source of the potential exposure.
- See table 57 for a summary of clinical management of PEP for HIV exposure.

**Table 60: Degree of risk of HIV-infection after occupational exposure**

	Low Risk	Medium Risk	High Risk
<b>Type of exposure</b>	Intact skin	Mucous membrane/non-intact skin	Percutaneous injury
<b>Source</b>	HIV negative (possibly in window period i.e., a period of time <i>after</i> a person is infected during which they won't test positive. This is called the "HIV window period")	HIV status unknown: Clinical well/ unwell	HIV positive with advanced disease, or confirmed drug resistance (consider treatment history)
<b>Material</b>	Saliva, tears, sweat, faeces, urine, sputum, vomitus	Semen, vaginal secretions, pleural, pericardial, peritoneal	Blood and body fluids: cerebral spinal fluid (CSF); viral cultures in labs, and amniotic fluid

### Post-exposure prophylaxis is not indicated under the following circumstances:

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

## Counselling the HCW for PEP

- At the time that the HCW first presents after exposure, counselling should be provided about their risk, the need for PEP, and its specific aspects, and the need for HIV testing to rule out the possibility that they might already be infected with HIV. Counselling should be provided before seeking informed consent for post-exposure prophylaxis. **note: informed consent for PEP services need not be in writing**
- The counselling should include information about, duration and course of medication (28 days), importance of adherence to the regimen, the possibility of side effects or toxicity, possible resistance to antiretroviral (ARV) medication, and the risk of transmission.
- The counsellors should assess the HCW's understanding of the dosing instructions.
- Risk-reduction counselling should be reinforced in later visits with appropriate follow-up support services to maximize adherence to the PEP regimen and to manage any side effects.
- Counselling to reduce risk is also necessary to prevent the transmission of HIV.
- Exposed persons should be counselled as follows:
  - Use condoms or other protective preventive measures with sexual partners until an HIV test after confirmatory test to the exposure event is negative.
  - Discontinue breastfeeding (if applicable).
  - Do not donate blood.
- People already living with HIV should be referred to an appropriate clinic for treatment of their infection, and if they had started PEP, the medication will be discontinued if their initial HIV test is positive, because this medication does not work for people living with HIV and could increase the risk of drug resistance among people already infected.
- PEP is critical.
- Whereas most medication that are prescribed for PEP are safe during pregnancy, women should be informed of the possible risk of transmitting HIV to the baby during pregnancy, especially at the initial stage of infection. Women who are breast-feeding should be told that although taking PEP is not harmful, if a woman gets infected by HIV while breastfeeding, the risk of transmitting HIV through breastfeeding is higher at the early stage of infection.
- Appropriate counselling should include a discussion of safe alternatives to breastfeeding if they are acceptable, feasible, affordable, safe, and sustainable. Exclusive breastfeeding is strongly recommended for babies less than six months of age whenever alternatives are not possible.
- Discussing the risk of HIV transmission associated with consensual sex after a person has been occupationally exposed could be difficult given the sensitive nature of the issue, but this dialogue is essential. HCWs need to be aware that some of the exposed people might not welcome the prospect of having to talk to sexual partners about the need to use a condom, and this can create barriers to follow-up and PEP adherence.
- Offering exposed individuals assistance in talking to their sexual partners about using condoms might be appropriate. People who have been exposed to HIV require emotional support in the period following the exposure.

## PEP Side effects

- The most commonly reported side effects are nausea and fatigue. Side effects can be reduced, for example, by taking prescription medication (such as antiemetic for nausea) and by taking medicines with food. It is important for the person to anticipate and understand the side effects to avoid confusing them with symptoms of HIV seroconversion.

## Duration of PEP

- The recommended duration of PEP for HIV infection is 28 days.
- The first dose should always be offered as soon as possible after exposure and the full PEP should be taken, unless there are specific reasons to stop.
- Starter packs with an incremental, full 28 days of dosing can be used.

### Laboratory evaluation: Baseline HIV testing

- Baseline testing for HIV antibodies should be done to establish serologic status of the HCW at the time of exposure. This allows identification of HCWs who are already living with HIV, thereby avoiding the use of PEP for such people. Rapid HIV testing is the preferred option for testing both the exposed and source person. It also helps prevent giving PEP to an exposed person unnecessarily, that is, when the source person tests negative for HIV infection or is unlikely to be in the window period.
- If delays in testing of HIV are common, first dose of PEP should be provided based on the risk evaluation and the likelihood that the source person is HIV positive. Further evaluation should be made as soon as possible after the test results are known. A positive rapid test should be confirmed with a second, different rapid test
- If rapid testing is not available, offer pre-test counselling. People who have a positive rapid test result should be referred to a comprehensive care clinic for management and further follow up. Follow-Up HIV Testing should be performed at 6 and 12 weeks and six months post-exposure, regardless of the use of PEP.

### Laboratory testing should be offered on an individual basis:

- Test haemoglobin level when AZT is used for PEP. AZT should be avoided if anaemia is confirmed.
- Test for other blood-borne diseases such as HBV and hepatitis C virus (HCV), depending on the nature of the risk and the local prevalence.

### Record-Keeping

- PEP services need to be documented at several levels. A national registry should be maintained to document the extent and outcomes of PEP use. Data are also needed to evaluate PEP services and identify trends, to make comparisons across services and over time, to guide future service planning and resource allocation, to support operational studies, and to demonstrate accountability to donors. This can often be facilitated by using a set of programme indicators. At the local level, incident reports are critical for reviewing when and how exposure occurs and for identifying safety concerns and possible preventive measures.
- The quality of data will be compromised if reporting requirements are excessively time-consuming, complicated, or too difficult. Thus, record-keeping systems should be kept as simple as possible. Data should be collected and analysed based on existing collection mechanisms whenever possible. The data collected as part of the record-keeping system also need to be reviewed and reported. The results of any data analysis should be shared with service providers and stakeholders. Maintaining the confidentiality of client data is of paramount importance. Written records of risk assessments, HIV tests, and PEP prescriptions should be subject to the same rigorous confidentiality controls as any other medical records. Secure systems for storing data and controls on access to medical records should be developed.

**Table 61: Summary of clinical management of PEP for HIV exposure**

Item	Recommended Action And notes
Eligibility	Exposure was within 72 hours Exposed person is not known to be infected with HIV Significant exposure occurred Source patient tested negative for HIV but is still in the window period
Informed consent for PEP	Inform HCW about risks and benefits Consent may be given verbally
Medicine	First line of ARV medicine to be dispensed by a qualified person
Time to initiation	The initial dose of ARV medicines should be given as soon as possible but no later than 72 hours after exposure
Duration of therapy	Medicine should be taken for 28 days
HIV testing with informed consent and pre and post counselling according to protocols	Conduct baseline HIV testing in exposed person Follow up HIV testing at 6 weeks, 12 weeks and 6 months after exposure Conduct rapid HIV test on the source patient if feasible and informed consent is obtained. Use Standard Operating Procedures
Additional laboratory evaluations	Pregnancy test if deemed necessary
Counselling	Stress the need for adherence and discuss side effects of medications, risk reduction, trauma or mental health problems, social support and safety
Referral	Make referrals as appropriate
Record keeping	Maintain accurate confidential records
Clinical follow-up	Assess and manage side effects, Assess and support adherence

### Clinical follow-up

- Follow-up and clinical monitoring to determine adherence and to identify and manage side effects should be provided. All available methods of communication should be considered.

### Follow-up counselling

- In addition to the counselling outlined above, appropriate psychosocial support and further treatment assistance should be offered to all people who have received PEP, as available and when required. Exposed individuals should be made aware of the support services available and how to access them until the entire process including all testing is completed. This could be achieved by using a wider range of communication methods or by partnering with other local services to provide support during extended hours.

### Hepatitis B

- HBV infection is a well-recognized occupational risk for HCWs and can be transmitted via exposure to bodily fluids. In addition to percutaneous injury, contact of mucous membranes or non-intact skin with blood, fluids containing blood, tissue or other potentially infectious bodily fluids pose an infectious risk.
- HBV is highly infectious, can be transmitted in the absence of visible blood, and may remain infectious on environmental surfaces for up to 7 days. It is well established that the sero-

conversion after needle stick or sharp injuries contaminated with an infected source is 10–30% for HBV.

- Blood from persons with HBV infection contains the highest HBV titres of all body fluids and is the most important vehicle of transmission in the healthcare setting. The following body fluids also are considered potentially infectious: cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, and amniotic fluid. Although studies have documented HBV in saliva and tears, these body fluids have generally not represented an occupational risk for HBV infection unless they contain blood. Semen and vaginal secretions have been implicated in the sexual transmission of HBV, but they have not been implicated in occupational transmission from patients to HCWs. The presence of hepatitis B surface antigen (HBsAg), usually an indicator of active HBV infection, also is found in other body fluids (e.g., breast milk, bile, faeces, nasopharyngeal washings, and sweat). However, most body fluids are not efficient vehicles of transmission (unless they contain blood) because they contain low quantities of infectious HBV. Sputum, urine, and vomitus are not considered potentially infectious unless they contain blood.
- All HCWs whose work, training, and volunteer-related activities involve reasonably anticipated risk for exposure to blood or body fluids should be vaccinated with a complete >3 dose hepatitis B vaccine series. Antibodies for hepatitis B surface antigen (Anti-HBs) testing should be performed 1–2 months after administration of the last dose of the vaccine series when possible.
  - If anti-HBs is at least 10 IU/L (positive), the vaccinee is immune. No further serologic testing or vaccination is recommended.
  - If anti-HBs is less than 10 IU/L (negative), the vaccinee is not protected from hepatitis B virus (HBV) infection, and should receive 3 additional doses of HBV vaccine on the routine schedule, followed by anti-HBs testing 1–2 months later.
  - A vaccinee whose anti-HBs remains less than 10 IU/L after 6 doses is considered a “non-responder”.
  - HCWs who are non-responders should be considered susceptible to HBV and should be counselled regarding precautions to prevent HBV infection and the need to obtain HBIG prophylaxis for any known or probable parenteral exposure to hepatitis B surface antigen (HBsAg)-positive blood or blood with unknown HBsAg status.

#### Managing exposure to HBV (table 59):

- The suggested steps for managing a body fluid exposure are as follows:
  - Treat the exposure site appropriately.
  - Assess the risk of HBV exposure and determine the immune status of the patient (history of jaundice, hepatitis, or previous vaccination with hepatitis B vaccine).
  - If possible, collect a specimen from the HCW and from the patient for HBsAg testing.
  - Give the first dose of HBV vaccine, which should be repeated at one and six months. If hepatitis B immunoglobulin (HBIG) is available, give 5 ml intramuscularly for passive immunization as soon as possible, but within seven days of exposure.



**Table 62:** Post-exposure management of healthcare personnel after occupational percutaneous and mucosal exposure to blood and body fluids, by healthcare personnel –Hepatitis B vaccination and response status

Healthcare Worker Status	Post Exposure Testing		Post Exposure Prophylaxis		Post-vaccination serologic testing†
	Source patient (HBsAg)	HCP testing (anti-HBs)	HBIG*	Vaccination	
Documented responder after complete series (≥3 doses)	<b>No action needed</b>				
Documented non-responder after 6 doses	Positive/unknown	—**	HBIG x2 separate by 1 month	—	No
	negative	<b>No action needed</b>			
Response unknown after 3 doses	Positive/unknown	<10IU/L**	HBIG x1	Initiate revaccination	Yes
	Negative	<10IU/L	None		
	Any result	≥10IU/L	<b>No action needed</b>		
Unvaccinated/incompletely vaccinated or vaccine refusers	Positive/unknown	—**	HBIG x1	Complete vaccination	Yes
	Negative	—	None	Complete vaccination	Yes

• **Abbreviations:**

- HCW = health-care Worker; HBsAg = hepatitis B surface antigen; anti-HBs = antibody to hepatitis B surface antigen; HBIG = hepatitis B immune globulin.
- \* HBIG should be administered intramuscularly as soon as possible after exposure when indicated. The effectiveness of HBIG when administered >7 days after percutaneous, mucosal, or nonintact skin exposures is unknown. HBIG dosage is 0.06mL/kg.
- † Should be performed 1–2 months after the last dose of the Hep B vaccine series (and 4–6 months after administration of HBIG to avoid detection of passively administered anti-HBs) using a quantitative method that allows detection of the protective concentration of anti-HBs (≥10 IU/L).
- A responder is defined as a person with anti-HBs ≥10 IU/L after ≥3 doses of Hep B vaccine.
- A non-responder is defined as a person with anti-HBs <10 IU/L after ≥6 doses of Hep B vaccine.
- \*\* HCW who have anti-HBs <10 IU/L, or who are unvaccinated or incompletely vaccinated, and sustain an exposure to a source patient who is HBsAg-positive or has unknown HBsAg status, should undergo baseline testing for HBV infection as soon as possible after exposure, and follow-up testing approximately 6 months later. Initial baseline tests consist of total anti-HBc; testing at approximately 6 months consists of HBsAg and total anti-HBc

**Exposure to HCV**

- There is no post-exposure vaccine or drug prophylaxis for HCV (immunoglobulin is ineffective). Prevention of exposure is the only effective strategy for preventing HCV. The following steps should be considered for follow-up of HCWs who become exposed to HCV-positive blood or other body fluids.
- Management Of employee after HCV exposure  
At time of exposure:
  - Determine the type of exposure and assess the associated risk.
  - Wash wounds with soap and water; flush mucous membranes with water.

- No post-exposure prophylaxis (immunoglobulin or antiviral medications) is recommended
- Counsel the exposed person regarding hepatitis C transmission risk
- Test source and exposed individual for hepatitis C virus antibody and liver enzymes for exposed individual.
- If source is not available or refuses testing, treat exposed person as if source has active hepatitis C infection.
- If source is hepatitis C virus antibody positive, or is antibody negative and is immunocompromised, test source for qualitative HCV RNA.
- If source is negative for hepatitis C antibody (and HCV RNA, if indicated), no further testing is necessary and no further action beyond initial HCV testing, is necessary for the exposed person
- If source is positive for hepatitis C antibody and HCV RNA, and exposed person is negative, follow up of exposed person should be done.

#### Follow up of exposed HCW to HCV positive source:

- Perform baseline testing for anti-HCV and ALT activity; and Perform follow-up testing at 3 and 6 months for anti- HCV antibodies and ALT activity – if earlier diagnosis of HCV infection is desired, testing for HCV RNA (viral load) may be performed at 4 and 12weeks.

#### PEP and exposures to Lassa fever

- The antiviral drug Ribavirin seems to be an effective treatment for Lassa fever if given early on in the course of clinical illness.
- There is no evidence to support the role of Ribavirin as post-exposure prophylactic treatment for Lassa fever.
- There is currently no vaccine that protects against Lassa fever.
- Further information on Lassa Fever here:

<https://www.who.int/news-room/fact-sheets/detail/lassa-fever>

#### Mycobacteria tuberculosis (MTB)

- Refer to chapter 4 TBPs: airborne precautions.
- Mycobacteria tuberculosis (MTB) is a known problem in Sierra Leone and therefore a TB programme is essential in all health-care settings as part of a robust approach to IPC.
- The TB program should be designed to ensure prompt detection, initiation of airborne precautions and treatment of persons who have suspected or confirmed MTB disease (or prompt referral of persons who have suspected MTB disease for settings in which persons with MTB disease are not expected to be encountered).
- HCWs, including nurses, doctors, clinical officers, nursing and medical students, housekeeping staff, and others are vulnerable to TB exposure, infection, and disease. HCWs are at even greater risk in the following circumstances:
  - Aerosol-generating or aerosol-producing procedures, including bronchoscopy, endotracheal intubation, suctioning, other respiratory procedures, open abscess irrigation, autopsy, sputum induction, and aerosol treatments that induce coughing.
  - When they are working with difficult-to-treat TB such as relapses, treatment failure, multi-drug resistant (MDR), and extensively drug-resistant (XDR)TB.
- In addition to performing work that involves diagnosis and treatment of TB, other risk factors for HCWs include the following:
  - Prolonged contact with patients with unrecognized TB disease who are not promptly handled with appropriate airborne precautions or patients moved from an airborne infection isolation (AII) room too soon (e.g., patients with unrecognized TB, patients with MDR or XDR TB).
  - Longer duration of employment.
  - Working without following IPC procedures.
  - Having HIV infection.

## Recommendations for TB Screening procedures for Settings (or HCWs) classified as medium Risk

- All HCWs should receive baseline TB screening upon hire, using chest x-ray, two-step tuberculin skin test (TST) or a single Bio Medical Admissions Test (BAMT) to test for infection with TB.
- After baseline testing for infection with TB, HCWs should receive TB screening annually (e.g., symptom screen for all HCWs and testing for infection with TB (for HCWs with baseline negative test results)).
- HCWs with a baseline positive or newly positive test result for TB infection or documentation of previous treatment for latent TB infection (LTBI) or TB disease should receive one chest radiograph result to exclude TB disease.
  - Instead of participating in serial testing, HCWs should receive a symptom screen annually.
  - This screen should be accompanied by educating the HCW about symptoms of TB disease and instructing the HCW to report any such symptoms immediately to the occupational health unit
- **TB Screening procedures for Settings (or HCWs) classified as potential ongoing transmission**
- Testing for infection with TB might need to be performed every 8–10 weeks until lapses in infection control have been corrected, and no additional evidence of ongoing transmission is apparent.
- The classification of potential ongoing transmission should be used as a temporary classification only. It warrants immediate investigation and corrective steps. After a determination that ongoing transmission has ceased, the setting should be reclassified as medium risk. Maintaining the classification of medium risk for at least 1 year is recommended.

## HCWs with active TB

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

## SARS coronavirus (SARS CoV-2, SARS-CoV, or SARS)

- It is important to note that according to current WHO evidence, SARS-CoV-2, the virus that causes COVID-19, is primarily transmitted between people through respiratory droplets and close contact routes therefore Standard Precautions (chapter 3) and transmission-based precautions (chapter 4) should be employed.
- Within health care facilities, including long term care facilities, WHO continues to recommend droplet and contact precautions when caring for COVID-19 patients and airborne precautions when and where aerosol generating procedures are performed. WHO also recommends standard or transmission-based precautions for other patients using an approach guided by risk assessment.

- HCWs are at high risk of being exposed to the infection, however IPC precautions will protect workers.
- In areas with COVID-19 community transmission, WHO advises that health workers and caregivers working in clinical areas should continuously wear a medical mask during all routine activities throughout the entire shift.
- In settings where aerosol generating procedures are performed, they should wear an N95, FFP2 or FFP3 respirator.
- WHO guidance also emphasizes the importance of administrative and engineering controls in health care settings, as well as rational and appropriate use of all PPE and training for staff on these recommendations
- Administrative measures related to health workers include:
  - provision of adequate training for health workers;
  - ensuring an adequate patient-to-staff ratio;
  - establishing an active syndromic surveillance of health workers at the facility entrance when they arrive at work
  - ensuring that health workers and the public understand the importance of seeking medical care promptly;
  - monitoring health workers' compliance with standard precautions and providing mechanisms for improvement as needed.

### Management of HCWs exposed to COVID-19 virus

- The management of HCWs exposed to COVID-19 varies according to their risk categorization. To determine the risk, the form "Risk assessment and management of exposure of health care workers in the context of COVID-19" [https://apps.who.int/iris/bitstream/handle/10665/331496/WHO-2019-nCov-HCW\\_risk\\_assessment-2020.2-eng.pdf?sequence=1&isAllowed=y](https://apps.who.int/iris/bitstream/handle/10665/331496/WHO-2019-nCov-HCW_risk_assessment-2020.2-eng.pdf?sequence=1&isAllowed=y) should be completed and based on responses to the questions the exposure will be classed as high or low risk.

### Recommendations for HCWs at high risk for infection:

- Stop all health care interactions with patients for a period of 14 days after the last day of exposure to a confirmed COVID-19 patient;
- Be tested for COVID-19;
- Quarantine for 14 days in a designated setting.

### Health care facilities should:

- Provide psychosocial support to HCW during quarantine, or throughout the duration of illness if HCW is confirmed to have COVID-19;
- Provide compensation for the period of quarantine and for the duration of illness (if not on a monthly salary) or contract extension for duration of quarantine/illness;
- Provide review of IPC training for the health care facility staff, including HCWs at high risk for infection after 14-day quarantine period.

### Recommendations for health workers at low risk for COVID-19:

- Self-monitor temperature and respiratory symptoms daily for 14 days after the last day of exposure to a COVID-19 patient. HCWs should call the health care facility if they develop any symptoms suggestive of COVID-19;
- Reinforce contact and droplet precautions when caring for all patients with acute respiratory illness and standard precautions for all patients;
- Reinforce airborne precautions for aerosol-generating procedures on all suspected and confirmed COVID-19 patients;

- Reinforce the rational, correct, and consistent use of personal protective equipment;
- Apply WHO’s “My 5 Moments for Hand Hygiene” before touching a patient, before any clean or aseptic procedure, after exposure to body fluid, after touching a patient, and after touching a patient’s surroundings;
- Practice respiratory etiquette at all times.

SARS may be initially missed due to the non-specific nature of presenting symptoms, the possibility of absence of fever on initial measurements atypical presentations, co-morbidities masking SARS and the recognized difficulties of clinically diagnosing an atypical pneumonia.

**Meningococcal meningitis**

- Employers should provide adequate infection-control training to staff members, (e.g., use of appropriate PPE- mask when caring for suspected patients), PEP to exposed workers, and report notifiable diseases promptly to the local public health department.
- Symptoms of meningococcal disease are usually sudden onset of fever, headache, and stiff neck. It can start with symptoms similar to influenza (flu), and will often also cause nausea, vomiting, increased sensitivity to light, rash, and confusion.
- HCWs in close respiratory contact (e.g., suctioning, intubation) with such cases should receive PEP with ciprofloxacin or an effective alternative agent.

In addition to the IPC measures outlined in this section, the following controls should be implemented:

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

**Table 63: Approach to using a multimodal strategy to improve compliance with procedures and eliminate the risk of occupational exposures or HAIs**

System change – build it <i>(the system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources)</i>	<ul style="list-style-type: none"> <li>• Put in place/improve reliable access to the right equipment and supplies including PPE, hand hygiene products, puncture-resistant, leak-proof, labelled or colour-coded sharps containers that are located as close as possible to their places of use; leak-proof containers for specimens and other regulated wastes that are properly labelled or colour-coded; an easily accessible first-aid kit in all departments and an environment that is designed and planned to facilitate patient and health worker safety. This includes vaccination programs.</li> <li>• Establish appropriate engineering controls (controls used to remove/reduce a hazard or place a barrier between the worker and the hazard in health care facilities).</li> </ul>
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	<ul style="list-style-type: none"> <li>• Provide clearly written policies, guidelines, and procedures (SOPs) including protocols for surveillance and management of job-related illnesses and exposures to infectious diseases <ul style="list-style-type: none"> <li>▪ Invest in adequate staffing levels</li> </ul> </li> </ul>
<p>Training and education – teach it <i>(to improve health worker knowledge)</i></p>	<ul style="list-style-type: none"> <li>• Provide a program of routine health and safety orientation, education and training and periodic retraining for all personnel (e.g., yearly).</li> <li>• Training should cover all cadres of staff, including doctors, nurses, clinical officers, laboratory workers, nonmedical workers, and support staff and should be matched to the roles/responsibilities of each groups <ul style="list-style-type: none"> <li>▪ Health and safety training should ensure that workers know and understand the potential risks that are associated with waste from health care facilities, the value of immunization against vaccine preventable diseases such as, HBV and the importance of appropriate use of PPE.</li> </ul> </li> </ul>
<p>Monitoring and feedback – check it <i>(to assess the problem, drive appropriate change and document practice improvement)</i></p>	<ul style="list-style-type: none"> <li>• Pre-placement health evaluation of HCWs</li> <li>• Record and monitor exposures to blood and body fluids</li> <li>• Monitor and maintain surveillance of work practices</li> </ul>
<p>Reminders and communication – sell it <i>(to promote the desired actions, at the right time, including campaigns)</i></p>	<ul style="list-style-type: none"> <li>• Prompt and remind all HCWs about safe practices by using accurate, well placed, accurate reminders which are checked and replaced regularly</li> <li>• Establish and maintain a routine communications activity between IPC and Occupational Health Programmes (where they exist)</li> </ul>
<p>Culture and change – live it <i>(to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models)</i></p>	<ul style="list-style-type: none"> <li>• Managers and leaders at every level of the HCF show their visible support for occupational health and safety to help develop and reinforce a culture of patient safety</li> <li>• This includes counselling services for personnel regarding infection risks related to employment or special conditions and the development, review and revision of policies and procedures and their ready availability in the HCF</li> <li>• Maintain confidential employee health and injury records.</li> </ul>

### Additional considerations

In addition to the IPC measures outlined in this section, the following controls should be implemented:

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

## Chapter 10: IPC in special areas of the hospital

### General introduction

The recommendations and approaches to the prevention and control of infection outlined across all chapters of these national guidelines aim to keep patients and health care workers safe and minimise the risk of acquiring an HAI.

Some areas of the health facility present particular challenges due to the nature of the procedures performed or the types of patients cared for. This chapter focuses on these areas and summarises any additional IPC considerations that need to be addressed. It does not duplicate, for example, the requirements of Standard and transmission Based Precautions nor does it describe hand hygiene in detail, however it signposts the reader to the relevant chapter/section of the Guidelines.

### Operating Room

<b>Relevant international and national guidance and tools</b>	Global guidelines for the prevention of surgical site infection <a href="https://apps.who.int/iris/bitstream/handle/10665/250680/9789241549882-eng.pdf?sequence=8">/apps.who.int/iris/bitstream/handle/10665/250680/9789241549882-eng.pdf?sequence=8</a> surgical safety checklist <a href="https://www.who.int/patientsafety/safesurgery/checklist/en/">https://www.who.int/patientsafety/safesurgery/checklist/en/</a> SSI prevention. Key facts on decolonization of nasal carriers of <i>Staphylococcus aureus</i> information leaflet <a href="https://www.who.int/infection-prevention/tools/surgical/FACT_SHEET_Staphylococcus_web.pdf?ua=1">https://www.who.int/infection-prevention/tools/surgical/FACT_SHEET_Staphylococcus_web.pdf?ua=1</a> pre-operative skin preparation video <a href="https://youtu.be/9E1t7AHW3i8">https://youtu.be/9E1t7AHW3i8</a> surgical hand preparation technique <a href="https://www.youtube.com/watch?v=h16JPBcOIGs">https://www.youtube.com/watch?v=h16JPBcOIGs</a>
<b>Key practice points</b>	<ul style="list-style-type: none"> <li>• Adherence with all IPC recommendations contained within the national guidelines is important.</li> <li>• Appropriate design and layout of the department as per international guidelines aims to minimise risks of infection. Staff should have access to the right equipment, safe and appropriate decontamination and sterilization of equipment and materials, necessary PPE, supplies and an environment that facilitates safe practice.</li> <li>• A program of routine training and education and periodic retraining for all HCWs on IPC should be in place highlighting the special importance of IPC in the OR</li> </ul> <p>A program of regular monitoring and feedback should be in place</p> <ul style="list-style-type: none"> <li>• IPC practices should be reinforced through awareness raising (e.g., use of posters displayed at the point of care)</li> <li>• Managers and leaders of the OR should show their visible support for safe practice and patient and staff safety</li> </ul>
<b>Introduction – why SSI prevention is important</b>	<ul style="list-style-type: none"> <li>• Surgical site infection (SSI) is the most frequent type of infection in low- and middle-income countries with incidence rates ranging from 1.2 to 23.6 per 100 surgical procedures (11.8% pooled incidence).</li> <li>• Infection is the <u>most frequent complication</u> of surgery in Africa.</li> <li>• Pooled SSI incidence in LMICs (WHO unpublished data, 2017); 5.9 per 100 procedures, 11.2 per 100 surgical patients</li> <li>• Few studies from LMICs report SSI rates by surgical procedure and data on microbiological causes of SSI</li> <li>• Most frequent pathogens are <i>S. aureus</i> (20.3%) and <i>Escherichia coli</i> (<i>E. coli</i>) (20.3%)</li> <li>• Average methicillin resistance among <i>S. aureus</i> isolates (MRSA): 54.5%</li> <li>• Surgical sepsis = 30% of all patients with sepsis</li> <li>• Infection can be acquired in an operation exogenously (e.g., from air, equipment, staff) or endogenously (e.g. skin flora, operative site).</li> <li>• It is important to understand and use local, country and regional data to explain what the common SSI problems are and to explain to others the improvement approach to prevention – there is a known lack of adherence to safe SSI prevention processes.</li> </ul>
<b>When to prevent SSI</b>	Pre-operative, intra and post-operative measures prevent SSI.

	<p>It is important to understand that pre-operative measures have been taken <u>prior to surgery</u>:</p> <ul style="list-style-type: none"> <li>• Patient has bathed or showered prior to surgery with plain or antimicrobial soap</li> <li>• 2% mupirocin decolonization has taken place in known nasal carriers of <i>Staph aureus</i> in cardiac and ortho surgery</li> <li>• Hair has not been removed and if absolutely necessary has been removed using clippers immediately prior to surgery</li> <li>• Surgical antibiotic prophylaxis has been administered in the 120 mins preceding surgical incision (an example of surgery not requiring SAP is clean orthopaedic surgery not involving implantation of foreign materials)</li> <li>• Hands have been scrubbed using the correct technique with a suitable antimicrobial soap and water OR an alcohol-based hand rub</li> <li>• Manual bowel prep has been carried out, combined with administering pre-op oral antibiotics in adult patients undergoing elective colorectal surgery</li> <li>• Administration of oral or enteral multiple nutrient enhanced formulas in underweight patients undergoing major surgical operations has been considered</li> <li>• Immunosuppressive medication has not been discontinued</li> <li>• Sterile surgical equipment and instruments is ready for use for each surgical procedure</li> <li>• The OR has been cleaned and prepped.</li> </ul>
<p><b>How to prevent SSI in the OR</b></p>	<p>The surgical time supported by procurement/budgeting and other clinical, pharmacy, sterilisation and maintenance staff where relevant should:</p> <ul style="list-style-type: none"> <li>• Not use laminar airflow ventilation systems</li> <li>• Use either disposable sterile non-woven or reusable sterile woven drapes and surgical gowns</li> <li>• Not use plastic adhesive incise drapes (neither those with or without out antimicrobial properties)</li> <li>• Use an alcohol-based antiseptic solution based on CHG for surgical site skin preparation in patients undergoing surgical procedures</li> <li>• Not sure antimicrobial sealants after skin prep</li> <li>• Consider administering 80% fraction inspired O<sub>2</sub> (in patients undergoing general anaesthesia with ET tube) and continue for 2-6hrs post-op</li> <li>• Consider using a warming device</li> <li>• Consider using a protocol for intensive blood glucose control (diabetic and non-diabetic patients)</li> <li>• Consider using goal directed therapy</li> <li>• Consider irrigating incisional wounds with an aqueous povidone iodine solution (in clean and clean contaminated wounds)</li> <li>• Not perform antibiotic wound irrigation</li> <li>• Consider using wound protector devices (in clean-contaminated, contaminated and dirty abdominal procedures)</li> <li>• Consider prophylactic negative pressure wound therapy</li> <li>• Consider using triclosan coated sutures</li> <li>• Maintain asepsis and discipline in the operating room</li> <li>• Not prolong surgical antibiotic prophylaxis in the post-op period and not continue SAP due to presence of a drain</li> <li>• Remove wound drains when clinically indicated</li> <li>• Cleaning requirements for surgical areas</li> </ul>
<p><b>Considerations in facilities with limited resources</b></p>	<ul style="list-style-type: none"> <li>• Decolonisation only applies to facilities where screening (nasal swabs sent to a laboratory) for <i>S. aureus</i> is feasible, and may not apply to settings with high prevalence of mupirocin resistance.</li> <li>• Alcohol/CHG-based skin preparation solutions can be produced locally if needed.</li> <li>• Where supplies of ABHR are limited or prohibitively expensive, they can be produced locally according to WHO-recommended formulations.</li> <li>• In settings where water access/quality is an issue, <a href="#">address annual water service plans</a>.</li> </ul>



	<ul style="list-style-type: none"> <li>Resources to deliver FiO<sub>2</sub> can be challenging, O<sub>2</sub> supply as well as high flux masks. However, efforts should still be made to address these requirements. Local solutions are possible.</li> </ul>
<b>Additional considerations</b>	<ul style="list-style-type: none"> <li>The application of mupirocin is usually twice a day for 5–7 days before surgery or from the day of hospital admission to the day of surgery.</li> <li>Correct dosage of SAP is important to have the right antibiotic concentration at the operation site throughout the entire operation. Correct use of SAP is important not only to prevent SSI but also to avoid emergence of antimicrobial-resistant pathogens that can cause more serious disease to the patient.</li> <li>Once in the operating area, repeating hand rubbing or scrubbing without an additional prior handwash is recommended before switching to the next procedure.</li> <li>Ensure correct placement of patient (to avoid movement after skin prep but considering areas of skin that might be prone to breaking down due to the pressure of being in one position for too long) and ensure skin preparation is <b>not</b> removed/washed off before draping.</li> <li>Half-life of antibiotics may affect serum and tissue concentrations.</li> <li>While there is no evidence for double-gloving, in surgery it is plausible that bacterial contamination of the surgical field may occur in the event of glove perforation. Moreover, most surgeons prefer to wear double gloves for their own protection against injury from sharps and/or bloodborne infections (BBVs) (as do health workers in settings with high prevalence of BBVs). In the case of double-gloving, a routine change of the outer gloves during long surgeries is often recommended by health care practitioners. However, there is no evidence to support these practices.</li> </ul>

## ICU

<b>Relevant international and national guidance and tools</b>	<ul style="list-style-type: none"> <li>WHO Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level <a href="https://www.who.int/infection-prevention/publications/ipc-components-guidelines/en/">https://www.who.int/infection-prevention/publications/ipc-components-guidelines/en/</a></li> <li>WHO Minimum Requirements for infection prevention and control (IPC) programmes <a href="https://www.who.int/infection-prevention/publications/min-req-IPC-manual/en/">https://www.who.int/infection-prevention/publications/min-req-IPC-manual/en/</a></li> <li>WHO Guidelines on Natural Ventilation for Infection Control in Health-Care Settings <a href="https://apps.who.int/iris/bitstream/handle/10665/44167/9789241547857_eng.pdf?sequence=1">https://apps.who.int/iris/bitstream/handle/10665/44167/9789241547857_eng.pdf?sequence=1</a></li> </ul>
<b>Key practice points</b>	<ul style="list-style-type: none"> <li>Appropriate design and layout of the ICU as per guidelines aims to minimise risks of infection. Staff should have access to the right equipment, safe and appropriate decontamination and sterilization of equipment and materials, necessary PPE, supplies and an environment that facilitates safe practice.</li> <li>A program of routine training and education and periodic retraining for all HCWs on IPC should be in place highlighting the special importance of IPC and the challenges posed by caring for people on the ICU</li> <li>A program of regular monitoring and feedback should be in place and surveillance systems robust to detect outbreaks</li> <li>IPC practices should be reinforced through awareness raising (e.g., use of posters displayed at the point of care)</li> <li>Managers and leaders of the unit should show their visible support for safe practice and patient and staff safety</li> </ul>
<b>Introduction – why IPC is important</b>	<ul style="list-style-type: none"> <li>Patients in ICU may experience increased risk of infection due to: <ul style="list-style-type: none"> <li>The severity of the patient's illness and underlying conditions.</li> <li>The exposure to multiple invasive devices and procedures.</li> <li>Increased patient contact with health-care personnel.</li> <li>A longer ICU stay which prolongs the risk of exposure.</li> <li>Space limitations that increase the risk of contaminating equipment.</li> <li>Antibiotic treatment for long periods.</li> </ul> </li> <li>Most common nosocomial infections are pneumonia (HAP/VAP), CAUTI and CLABSI</li> </ul>
<b>How and when to prevent HAI</b>	<ul style="list-style-type: none"> <li><b>Hand hygiene:</b> timely and effective hand hygiene at the right moment (chapter 3.1), with special attention to: <ul style="list-style-type: none"> <li>Before performing any invasive procedure including peripheral cannula insertion and removal (Moment 2)</li> </ul> </li> </ul>

- Before mixing Intravenous fluids (part of Moment 2)
- Before use of multi-dose vials (part of Moment 2)
- Before administration of IV fluids or medications/drugs (part of Moment 2)
- Follow standard and transmission-based precautions (chapters 3 and 4) including PPE (chapter 3.2)
- **IV care practices:** chapter 5 addresses aseptic technique for invasive procedures. Bloodstream infection (BSI) prevention is outlined in chapter 5.1, note the following additional considerations:
  - Use of aseptic technique relates to peripherally inserted central catheters (PICC) and guidewire exchange.
  - Do not routinely replace central venous catheters, haemodialysis catheters, or pulmonary artery catheters.
  - Do not remove CVCs or PICCS on the basis of fever alone. Use clinical judgment regarding the appropriateness of removing the catheter if infection is evidenced elsewhere or if a non-infectious cause of fever is suspected.
- **Respiratory care:** chapter 5 addresses aseptic technique for invasive procedures. Hospital acquired pneumonia (HAP) and ventilator associated pneumonia (VAP) prevention are outlined in chapter 5.3, note the following additional considerations:
  - Periodically drain and discard any condensate that collects in the tubing of a mechanical ventilator, taking precautions not to allow condensate to drain toward the patient. Decontaminate hands with soap and water or a waterless antiseptic agent after performing the procedure or after handling the fluid.
  - If available, use an endotracheal tube with a dorsal lumen above the endotracheal cuff to allow drainage (by continuous suctioning) of tracheal secretions that accumulate in the patient's subglottic area.
  - Use sucralfate, H2-blockers, and/or antacids interchangeably for stress-bleeding prophylaxis in a patient receiving mechanically assisted ventilation (H2-blockers alone decrease gastric acidity and increase gastric colonization and increases the susceptibility to respiratory infections).
- **ICU personnel:** see chapter 9, health care worker protection and safety which outlines immunization requirements. Jewellery and other accessories must not be worn during direct patient care.
- **Environment Factors and Design Issues:**
  - HAI surveillance is addressed in chapter 2.
  - Environmental Cleaning is described in chapter 3.3.
  - Health Care Waste Management is addressed in chapter 3.6.
  - Prevention of Sharps Injuries is addressed in chapter 3.7
  - The principles of sterilization and medical devices decontamination are outlined in chapter 6.
- Cleaning and disinfection or sterilization of patient care equipment should not be carried out in the ICU.
- Used equipment should be sent to the Sterile Service Department or designated reprocessing area. A policy on disposable and reusable items should be clearly defined.
  - Screening, triage and isolation: actions that support outbreak management and preparedness is addressed in chapter 8.
- **In addition, the unit design should consider the following to enhance IPC strategies.**
  - **Space: beds** - Beds should be 2.5 - 3 meters (7-9 feet) apart, to allow free movement of staff and equipment, reducing risk of cross-contamination.
  - **Space: partitions** - Privacy partitions should be of material that is easily cleaned and should be cleaned weekly and any time that it becomes soiled or contaminated. If curtains are used, they should be changed weekly and between patients.
  - **Toilets:** May be located outside the ICU.
  - **Medication preparation:** Medication preparation areas should be separate from patient care areas and should be maintained as a clean area.
  - **Clean storage:** An area should be identified and maintained for clean storage and should be separate from care and waste disposal areas.

	<ul style="list-style-type: none"> <li>○ <b>Ventilation:</b> Functioning environmental ventilation (natural or mechanical)<sup>1</sup> should be available. Windows (if exist) should remain closed in order to control all airborne risks</li> <li>○ <b>Clinical hand wash basins:</b> <ul style="list-style-type: none"> <li>▪ Clinical handwash basins have been implicated in numerous outbreaks of resistant organisms (CROs). They must not be used for other purposes. For example, they must not be used for the disposal of any amount of liquid waste or the soaking/cleaning of any items and equipment.</li> <li>▪ The dimension of the handwash basin should be large enough to contain most splashes during handwashing procedures.</li> <li>▪ Taps/faucets - Taps should be fitted with a hands-free control (for example, elbow-operated) to avoid contamination. If a handwash basin with conventional tap handles is used, the water should be turned off using a paper towel rather than bare fingers or hands to avoid recontamination of hands.</li> <li>▪ Taps should not be aligned to run directly into the drain aperture as contamination from the waste outlet could be mobilized and generate aerosols responsible for cross-infection, especially with Gram-negative bacteria (<i>Pseudomonas</i> spp., multidrug-resistant <i>Enterobacteriaceae</i>, etc.) that colonize 'U bends', and then dispersed by splashing if disturbed by a stream of water.</li> <li>▪ Swan-neck tap outlets are not recommended as they do not empty after use. Similarly, strainers, aerators and flow restrictors should not be used as they become colonized with bacteria.</li> <li>▪ Plugs – handwash basins should not have a plug or a recess capable of taking a plug as hands must be washed in running water. Provision of a plug allows the basin to be used to soak and clean items and equipment and this must not be done.</li> <li>▪ Overflow – handwash basins should not have an overflow as this is not amenable to cleaning.</li> <li>▪ Location – alcohol-based hand rub at the point of care (that is, within the patient zone) is the gold standard for routine hand hygiene. Ideally, clinical hand washbasins should not be located within the patient zone.</li> <li>▪ Do not locate hand basins where a patient may get splashed when the handwash basin is used. They should also be readily available and accessible when needed, for example, not behind curtains.</li> </ul> </li> <li>○ <b>Traffic flow:</b> The unit may be situated close to the operating theatre and to the emergency department for accessibility, but should be separate from the main ward areas. Policies should consider controlling traffic flow to and from the unit in order to reduce sources of contamination from visitors, staff and equipment.</li> <li>○ <b>Visitors:</b> Design of the unit should permit staff to assess visitors for communicable disease (eg, rash, respiratory infection) before permitted to enter unit. They should be instructed in hand hygiene according to the 5 Moments if assisting the patient.</li> </ul>
<b>Considerations in facilities with limited resources</b>	<ul style="list-style-type: none"> <li>• Refer to chapter 3, 4, 5, 6</li> </ul>
<b>Additional considerations</b>	<ul style="list-style-type: none"> <li>• Scrubs are routinely worn by all health care workers in ICU before attending to patients.</li> </ul>

<sup>1</sup> Natural ventilation: outdoor air driven by natural forces (for example, winds) through building purpose-built openings, including windows, doors, solar chimneys, wind towers and trickle ventilators. Mechanical ventilation: air driven by mechanical fans installed directly in windows or walls or in air ducts for supplying air into, or exhausting air from, a room.

## Neonatal care units (NCUs)

<b>Relevant international and national guidance and tools</b>	<ul style="list-style-type: none"> <li>• WHO Safe Childbirth Checklist <a href="https://www.who.int/patientsafety/implementation/checklists/childbirth/en/">https://www.who.int/patientsafety/implementation/checklists/childbirth/en/</a></li> </ul>
<b>Key practice points</b>	<ul style="list-style-type: none"> <li>• Appropriate design and layout of the department as per guidelines aims to minimize risks of infection. Staff should have access to the right equipment, safe and appropriate decontamination and sterilization of equipment and materials, necessary PPE, supplies and an environment that facilitates safe practice.</li> <li>• A program of routine training and education and periodic retraining for all HCWs on IPC should be in place highlighting the special importance of IPC and the challenges posed by caring for neonates</li> </ul> <p>A program of regular monitoring and feedback should be in place and surveillance systems robust to detect outbreaks</p> <ul style="list-style-type: none"> <li>• IPC practices should be reinforced through awareness raising (e.g., use of posters displayed at the point of care)</li> <li>• Managers and leaders of the unit should show their visible support for safe practice and patient and staff safety</li> </ul>
<b>Introduction – why IPC is important</b>	<ul style="list-style-type: none"> <li>• Low birth weight and the use of multiple invasive devices means that neonates are highly susceptible to HAI.</li> <li>• In addition, the combination of intensive care and high frequency of exposure of neonates to antibiotics (50-95%) provides an opportunity for emergence of antimicrobial resistant microorganisms.</li> <li>• Neonates are a vulnerable group, susceptible to HAIs.</li> <li>• Implementation of the IPC practices described in this guideline will protect this vulnerable group: hand hygiene according to the 5 Moments, standard and transmission-based precautions and adherence</li> <li>• Handling of neonates should be minimized.</li> <li>• Measures should be taken to minimize the risk of transmission of pathogens from mother to infant.</li> <li>• Staff should perform hand hygiene according to the 5 Moments as well as upon entering and leaving the nursery or NICU.</li> <li>• Equipment and supplies should not be shared between infants.</li> <li>• Infection risk increases with overcrowding and understaffing.</li> </ul>
<b>How and when to prevent HAI</b>	<ul style="list-style-type: none"> <li>• Strict adherence to IPC practices using a multimodal approach:             <ul style="list-style-type: none"> <li>○ Standard precautions and hand hygiene at the 5 moments (chapter 3)</li> <li>○ Transmission based precautions as indicated (chapter 4)</li> <li>○ Invasive devices and aseptic technique (chapter 5)                 <ul style="list-style-type: none"> <li>▪ <b>Umbilical Venous Catheters:</b> insert using aseptic technique. Only replace if the catheter site is infected or the catheter malfunctions. Remove and do not replace umbilical venous catheters if any signs of catheter related blood stream infection (CRBSI) or thrombosis are present. Cleanse the umbilical insertion site with an antiseptic before catheter insertion. Avoid tincture of iodine because of the potential effect on the neonatal thyroid. Other iodine-containing products (e.g., povidone-iodine) can be used. Do not use topical antibiotic ointment or creams on umbilical catheter insertion sites because of the potential to promote fungal infections and antimicrobial resistance. Umbilical venous catheters should be removed as soon as possible when no longer needed but can be used up to 14 days if managed aseptically.</li> <li>▪ Breast milk should be collected and stored aseptically. If a breast pump is used, all pump components in contact with milk should be washed with hot soapy water after each use and sterilized or disinfected daily.</li> </ul> </li> <li>○ Isolation, screening and triage (chapter 8).                 <ul style="list-style-type: none"> <li>▪ Isolation rooms are rarely indicated if there are adequate numbers of nursing and medical personnel and hand hygiene stations to support adherence to IPC practices; sufficient space is available for a 1–2-meter aisle area between newborn stations.</li> </ul> </li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>▪ Single room isolation is recommended for infants with infections with airborne transmission, such as varicella, measles, tuberculosis and possible influenza. A separate (quiet) room is also used for children with neonatal tetanus.</li> <li>▪ Infants of mothers with perinatal varicella (chicken pox) should also be isolated in a single room.</li> <li>○ AMR prevention strategies (chapter 7)</li> <li>○ Attention to environmental cleaning (chapter 3.6)</li> <li>○ Surveillance (chapter 2)</li> <li>○ Health care worker protection and safety (chapter 9)</li> <li>○ <b>Clinical hand wash basins:</b> <ul style="list-style-type: none"> <li>▪ Clinical handwash basins have been implicated in numerous outbreaks of resistant organisms (CROs). They must not be used for other purposes. For example, they must not be used for the disposal of any amount of liquid waste or the soaking/cleaning of any items and equipment.</li> <li>▪ The dimension of the handwash basin should be large enough to contain most splashes during handwashing procedures.</li> <li>▪ Taps/faucets - Taps should be fitted with a hands-free control (for example, elbow-operated) to avoid contamination. If a handwash basin with conventional tap handles is used, the water should be turned off using a paper towel rather than bare fingers or hands to avoid recontamination of hands.</li> <li>▪ Taps should not be aligned to run directly into the drain aperture as contamination from the waste outlet could be mobilized and generate aerosols responsible for cross-infection, especially with Gram-negative bacteria (<i>Pseudomonas</i> spp., multidrug-resistant Enterobacteriaceae, etc.) that colonize 'U bends', and then dispersed by splashing if disturbed by a stream of water.</li> <li>▪ Swan-neck tap outlets are not recommended as they do not empty after use. Similarly, strainers, aerators and flow restrictors should not be used as they become colonized with bacteria.</li> <li>▪ Plugs – handwash basins should not have a plug or a recess capable of taking a plug as hands must be washed in running water. Provision of a plug allows the basin to be used to soak and clean items and equipment and this must not be done.</li> <li>▪ Overflow – handwash basins should not have an overflow as this is not amenable to cleaning.</li> <li>▪ Location – alcohol-based hand rub at the point of care (that is, within the patient zone) is the gold standard for routine hand hygiene. Ideally, clinical hand washbasins should not be located within the patient zone.</li> <li>▪ Do not locate hand basins where a patient may get splashed when the handwash basin is used. They should also be readily available and accessible when needed, for example, not behind curtains.</li> </ul> </li> </ul>
<b>Considerations in facilities with limited resources</b>	<ul style="list-style-type: none"> <li>• Nosocomial conjunctivitis occurs frequently in NICUs. Eyes may become infected with water-borne organisms in humid incubators or from contamination with respiratory tract secretions. Care should be taken to prevent contamination of the eyes with drips from suction catheters after suctioning the nasopharynx or endotracheal tube.</li> </ul>
<b>Additional considerations</b>	<ul style="list-style-type: none"> <li>• In Sierra Leone, mothers may be exposed to Lassa fever or other viral haemorrhagic fevers (VHF). If this is possible from the mother's history or presentation, the new-born should be separated until the mother's status is known, and observed for infection in an isolation room with full IPC precautions. Expert advice should be sought on testing for VHF, and staff/ family advised on the risks when handling the baby.</li> <li>• Breast milk should not be used if the mother has an infection that can be transmitted through it. Taking routine cultures of expressed milk is not recommended.</li> <li>• Culturing of expressed breast milk may be indicated if there is concern about collection technique or if neonatal infection is suspected, but would need to be discussed with the laboratory/ microbiology for correct specimen handling and testing.</li> <li>• Incubators should be cleaned daily and cleaned and disinfected between babies.</li> </ul>

	<ul style="list-style-type: none"><li>• After use all removable parts of the incubator must be washed and thoroughly cleaned with detergent. Rinse and dry thoroughly using disposable paper towels. The incubator should also be cleaned and dried. Then all parts of the incubator should be disinfected using chlorine (200-500 ppm) Aerate the incubator before re-use.</li><li>• Staffing levels: One nurse per six to eight infants in a normal nursery; One nurse per two to three infants in an intermediate care nursery; One nurse per one to two infants in a NICU.</li><li>• Visitors should be taught about the importance of IPC including when and how to perform hand hygiene.</li><li>• Advise visitors to be vigilant for signs of infection.</li></ul>
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Annexes

Annex 1: Mixing chlorine/chlorine preparation.

**HOW TO DILUTE AND USE BLEACH**

World Health Organization  
Western Pacific Region

**WEAR PERSONAL PROTECTIVE EQUIPMENT**  
When preparing and using diluted bleach

goggles OR face shield  
gown  
gloves  
closed shoes

**PREPARE 0.5% BLEACH SOLUTION**  
For blood/bodily fluid spills disinfection

1 part 5% bleach + 9 parts water = 0.5% bleach

**PREPARE 0.1% BLEACH SOLUTION**  
A more diluted bleach solution is suitable for disinfecting other surfaces

1 part 0.5% bleach + 4 parts water = 0.1% bleach

**DO NOT** store diluted bleach in direct sunlight.  
Prepare solution in a well-ventilated area.

Prepare new daily bleach solution in a container that is clean and dry (e.g. a bucket).

Label bucket with concentration, date and time when it was made. Cover with a lid.

**DO NOT** use mixed solutions for more than 24 hours. They are no longer effective.

Clean surfaces first with detergent and water before disinfecting with bleach solution.

**DO NOT** spray detergent or diluted bleach directly onto surface, apply with a cloth or paper towel to protect the user.

Illustration of a person in protective gear preparing bleach in a bucket, with a 24-hour timer and a warning sign.

Figure 13: How to dilute bleach

## Annex 2: Step-by-step written procedure for insertion of a urinary catheter.

- Prepare the catheterization trolley outside of the patient zone
- Perform hand hygiene using ABHR (or soap and water if hands are visibly dirty) (moment 2)
- Clean trolley surface with clean warm water and detergent, then disinfect using alcohol wipe and allow to dry
- Gather the following materials: a clinical waste bag, an appropriately sized sterile catheter, two pairs of appropriately sized sterile gloves, a sterile pack containing a gallipot, cotton balls, forceps, a kidney tray, two sterile drapes, and one sterile fenestrated drape, a sachet of single use normal sterile saline solution, a syringe containing 10mls of sterile water, a syringe containing single use sterile anaesthetic lubricant, hypoallergenic tape or a leg strap to secure the catheter, a drainage bag, a sterile specimen container if a urine specimen is required, a disposable plastic apron
- If you have a pre-made catheterisation pack, study the contents list and collect any missing items
- Place all items unopened on the lower shelf of the trolley and proceed to the patient zone
- The preparation steps for female and male patients are identical
- Introduce yourself to the patient and explain the procedure. Confirm their identity and consent and discuss any concerns they may have
- Maintain the patient's privacy – if a single room is not available then use a screen or draw curtains around the patient
- Attach the clinical waste bag to the trolley and put on the apron
- Open the outer cover of the sterile pack and slide the contents onto the top shelf of the trolley. The pack is enclosed in a sterile wrapping – by pinching only at the corners, unfold this wrapping to create a sterile field
- Open all items of equipment using non-touch technique – this means that to maintain a sterile field you must only touch the outside of the packs and not the sterile parts
- Drop the items from their packs onto the sterile field without touching their contents
- Dispose of packaging according to the waste policy
- Perform hand hygiene using ABHR and don sterile gloves (moment 2)
- Pour sterile normal saline into the gallipot
- Place a sterile drape under the patients buttocks and the fenestrated drape over their genital area

• At this stage the procedure is different for female and male patients:

### Female patient:

- Ensure patient is comfortable and examine genital area to identify urethral meatus - use of additional light may be beneficial to aid visualization
- Spread the labia majora and labia minora to help locate the urethra – the hand used to do this is no longer sterile
- Using forceps in your other hand clean the urethra with sterile normal saline and a sterile cotton ball. Clean downwards in a single motion on the left side of the genital area discarding the cotton ball afterwards. Repeat on the right-hand side and in the middle. Clean in a circular motion around the urethra. Use a new cotton ball for each section of cleaning.
- Do not use an alcohol-based antiseptic.
- Dispose of gloves and perform hand hygiene (moment 3)
- Don new pair of sterile gloves for the next clean /aseptic task
- Use sterile gel to lubricate the tip of the catheter and insert into the urethral orifice and advance gently, only touching the plastic wrapping of the catheter tubing as you advance it
- If the catheter accidentally touches the vagina or the tip becomes contaminated discard it and use a new one
- Once the catheter has entered the bladder urine will begin to flow – at this point, continue to advance for around 5 cm, allowing any urine to leak into the kidney tray
- Using non-touch technique inflate the balloon of the catheter with 10mls of sterile water, following manufacturer's instructions (never use air to inflate the balloon). Do not touch the part of the syringe that enters the catheter or the part of the catheter tubing that enters the syringe
- Gently pull the catheter back until the retention balloon touches the bladder wall
- Connect catheter to the drainage bag using non-touch technique and secure the catheter by taping it to the inner thigh.



**Male patient**

- Ensure patient is comfortable and grasp shaft of penis (if patient is uncircumcised, retract the foreskin)
- Using forceps clean urethra in circular motion with cotton balls soaked in sterile saline
- Apply 10 mls of lidocaine lubricant gel from a syringe into the urethra and hold the penis for around 5 minutes to allow the anaesthetic to take effect
- Dispose of gloves and perform hand hygiene (moment 3)
- Don new sterile gloves for the next clean/aseptic task
- With one hand hold the penis firmly behind the glans and raise until it is almost totally extended, keeping it upright and perpendicular to the body throughout the insertion procedure.
- Using non-touch technique, only touching the plastic wrapping insert tip of catheter into the urethra and advance slowly. Resistance may be encountered, particularly when you reach the bladder – never use force as this may cause trauma (asking the patient to take a deep breath will help them to relax)
- If you feel resistance at the external sphincter of the urethra grip the penis slightly more firmly and apply steady gentle pressure on the catheter. Ask the patient to gently cough to ease the progress of the catheter, then continue to gently insert until urine is flowing
- Once the catheter is fully inserted, inflate the balloon with 10 mls of sterile water following manufacturer's instructions, then very gently pull it back until the retention balloon touches the bladder wall
- Connect catheter to the drainage bag using non-touch technique and secure the catheter by taping it to the inner thigh.
- Dispose of gloves and all remaining materials and equipment in clinical waste bag and seal
- Wash hand with soap and water (moment 3)
- Hang drainage bag using a stand or by placing on side of bed, ensuring it is below the level of the bladder to prevent backflow of urine.
- Never leave drainage bags on the floor as this can contaminate the urine drainage tap
- Help patient to replace their clothing and encourage them to report any discomfort or complications
- Record information in the medical notes including indication, date and time of insertion type of catheter used and volume of water used to inflate the balloon
- Leave patient zone along with trolley and place bag of clinical waste in the appropriate bin and clean trolley
- Perform hand hygiene (moment 4)

### **Annex 3: Procedure for post-operative wound care**

1. Patient preparation should take place including, an introduction and explanation, support to achieve a comfortable position, administration of pain relief as relevant, as well as checking of patient notes for any updates on their condition or the wound/dressing itself.
2. A decision should be made if the dressing will be removed using a non-touch or full aseptic technique (which will determine the type of gloves to be used). For surgical wounds with no signs of complication, a non-touch technique using non-sterile gloves is acceptable for initial wound dressing removal.
3. A wound assessment form should be gathered, if available, to facilitate the wound inspection.
4. Perform hand hygiene before touching the patient to expose the surgical wound dressing (whenever this action happens, this is a separate from the hand hygiene action Moment 2, before clean/aseptic procedure)
5. Prepare a clean, disinfected trolley by attaching a waste bag, adding a bottle of alcohol-based hand rub and a sterile wound dressing pack which contains all necessary items. If specimen collection is anticipated, a specimen collection pot/swab should be included.
6. Take the trolley to the patient. Perform hand hygiene and don non-sterile gloves and then gently remove the surgical wound dressing (be careful to avoid touching the wound directly).
7. Dispose of the old dressing and used gloves directly in the waste bag and perform hand hygiene (Moment 3, body fluid exposure risk).
8. Carefully examine the wound and surrounding skin (without touching wherever possible). If there are no signs of infection, no additional action is required and the patient can be instructed to shower as normal. The procedure is complete. At this moment, if the patient has been touched perform hand hygiene (Moment 4) and remove the dressing trolley, clearing and cleaning/disinfecting it as soon as possible.
9. If there are signs of infection, a doctor or wound specialist should be consulted. Likely a wound sample will need to be taken, either by collecting leaking fluid or if not possible by taking a swab.
10. To take a sample and carry on the procedure in this instance, if items have been touched since cleaning hands in step 7 (for Moment 3, body fluid exposure risk) then perform hand hygiene (for Moment 2 – before clean/aseptic procedure).
11. Open the sterile pack and empty the items on to the sterile field without touching them (discarding waste directly into the waste bag) and pour the sterile saline directly into the sterile container.
12. Perform hand hygiene (Moment 2) and don sterile gloves (sterile gloves are used as this is considered an aseptic procedure and the nurse will be reaching within the sterile field). Using sterile forceps, carefully manipulate the sterile gauze and soak it in the sterile saline.
13. Turn directly to the patient and clean the wound maintaining an aseptic technique, i.e. be careful not to touch other areas, other than the wound incision being cleaned). Do not repeatedly clean already cleaned sites and immediately dispose of the swab into the waste bag.
14. If a swab is being taken, carefully go into the exuding area of the wound as far as possible then carefully place the swab inside the container and seal tightly. Otherwise, hold a specimen pot close to the exuding fluid and capture as much as possible.
15. Proceed with routine wound cleaning again following the same procedure. Due to the leakage and suspected infection, apply a new dressing using a new set of sterile forceps. Dispose of all items in the waste bag, carefully remove gloves and perform hand hygiene (Moments 3 and 4 – after touching a patient).
16. Explain to the patient the sample will be tested and when results will be discussed with them.
17. Return the trolley to the preparation area, clear and clean/disinfect it as soon as possible and complete patient and sample documentation, sending sample for analysis. If the outside of the sample pot is contaminated, don sterile gloves to clean it before entering patient details (and then again perform hand hygiene – Moment 3).

#### **Annex 4: Steps for performing manual cleaning of medical devices.**

1. Wear heavy-duty rubber gloves, a plastic apron, eye protection, and mask during cleaning.
2. Soak the instruments in normal tap water containing a detergent for 3 – 5 minutes.
3. Scrub instruments and other items vigorously to completely remove all foreign material using a soft brush or old toothbrush, detergent, and water. Hold items under the surface of the water while scrubbing and cleaning to avoid splashing. Disassemble instruments and other items with multiple parts, and be sure to brush in the grooves, teeth, and joints to items where organic material can collect and stick.
4. Flush through lumens with an adapted water jet.
5. Rinse items thoroughly with clean water to remove all detergent. Any detergent left on the items can reduce the effectiveness of further processing.
6. Inspect items to confirm that they are clean.
7. Allow items to air dry or dry them with a clean towel if chemical disinfection is going to be used. This is to avoid diluting the chemical solutions used after cleaning. Items that will be high-level disinfected by boiling or steaming do not need to be dried

**Annex 5: Example of the parcel fold wrapping method.**

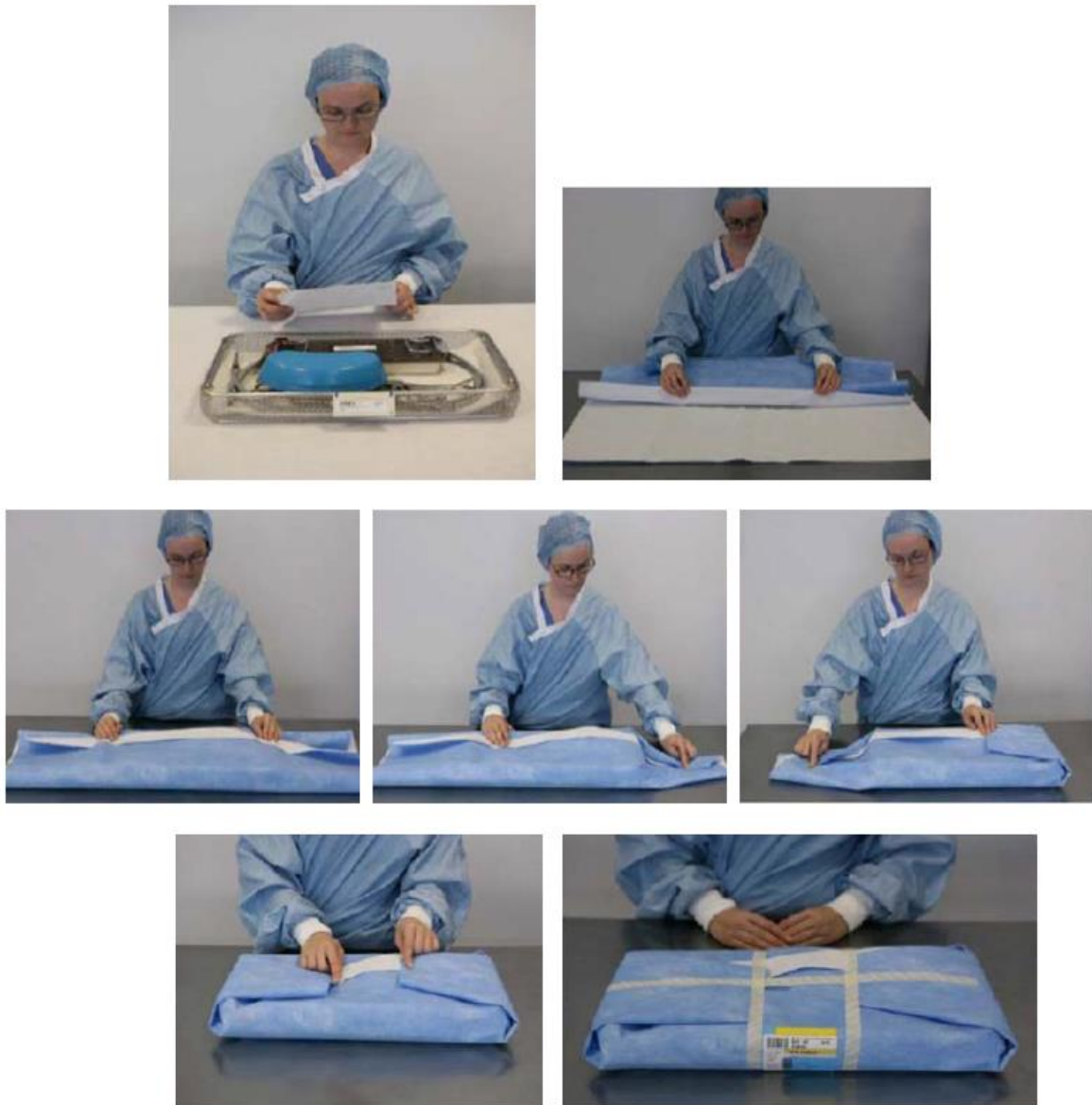


Figure 14: Example of the parcel fold wrapping method

### **Annex 6: Steps for performing high level disinfection.**

1. Clean and dry all items to be high-level disinfected. Water from wet instruments and from other items dilutes the chemical solution, thereby reducing its effectiveness.
2. When using a glutaraldehyde solution: Preparations of glutaraldehyde are non-corrosive to metals and other materials and inactivation by organic matter is very low. Alkaline solutions require activation; once activated they remain active for at least 2 weeks or 28 disinfection cycles depending on the frequency of use. If the solution is not activated prepare it in a sterile container by following the manufacturer's instructions. Fresh solution should be made each day (or sooner, if the solution becomes cloudy).
3. If using a previously prepared solution, use an indicator strip to determine if the solution is still effective. If preparing a new solution, put it in a clean container with a lid and mark the container with the preparation date and expiration date.
4. Open all hinged instruments and other items and disassemble those with sliding or multiple parts; the solution must contact all surfaces in order for HLD to be achieved.
5. Place all items in the solution so that they are completely submerged. Place bowls and containers upright, not upside-down, so that they fill with the solution.
6. Cover the container and allow items to soak for 20 – 45 minutes. During this period, do not add or remove any items from the container. Monitor the time.
7. Remove the items from the container using, dry, high-level disinfected pickups (e.g., forceps).
8. Rinse thoroughly with boiled water to remove the chemical residue that is left on items. This residue is toxic to skin and to tissues.
9. Place items to air-dry on a high-level disinfected tray or in a high-level disinfected container before use or storage. Use instruments and other items immediately or keep them in a covered and dry container.

### Annex 7: Steps for performing steam sterilization.

1. Clean all items to be sterilized.
2. Open or unlock all hinged items and disassemble items with multiple parts. Do not arrange items close together.
3. Arrange all labelled packs, drums, or unwrapped items in the chamber of the autoclave in a way that allows the steam to circulate freely. **DO NOT STACK.**
4. Follow the manufacturer instruction for operating the autoclave. Adjust time, temperature and pressure according to the set settings. It is best to use a timer, which helps ensure that the appropriate timing is achieved.
5. Do not begin timing until the autoclave reaches the desired temperature and pressure
  - If the timing process is forgotten, start the cycle again. If the autoclave is automatic, the heat will shut off and the pressure will begin to fall off once the sterilization cycle is complete.
  - If the autoclave is not automatic, turn off the autoclave after achieving the required time.
6. Wait until the pressure gauge reads “0” to open the autoclave. Open the lid or door to allow remaining steam to escape. Leave all items in the autoclave until they dry completely. It may take up to 30 minutes.
7. Remove packs, drums, or unwrapped items from the autoclave using sterile pick-ups to handle unwrapped items. The packs of equipment should come out of the autoclave dry. **Wet packs must be considered non-sterile.** Do not store packs, drums or unwrapped items until they cool to room temperature. This may take several hours.
8. Store items using the following guidelines:
  - Wrapped items – The length of time (=shelf life) that a wrapped, sterile item is considered sterile depends on whether or not a contaminating event occurs not necessarily on how long an item has been stored. Store items in a closed, dry, cabinet with moderate temperature and low humidity in an area that is not heavily trafficked. A wrapped pack can be considered sterile as long as it remains intact and dry. When in doubt about the sterility of a pack, consider it contaminated and re-sterilize the items.
  - Unwrapped items – use immediately after removal from the autoclave or keep them in a covered, dry, sterile container for up to one day.
9. Label accurately with contents, date of processing and expiration date and store wrapped materials in storage cabinet.

## Annex 8: Putting on basic personal protective equipment (PPE)

### Pre-donning instructions:

- Ensure healthcare worker hydrated
- Remove jewellery
- Check PPE in the correct size is available

- 1** Perform hand hygiene before putting on PPE.



- 2** Put on apron and tie at waist.



- 3** Put on mask (surgical/N95) - position upper straps on the crown of your head, lower strap at nape of neck.



- 4** With both hands, mould the metal strap over the bridge of your nose.



- 5** Don eye protection if required.



- 6** Put on gloves.

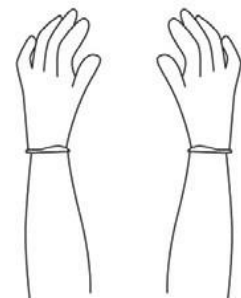


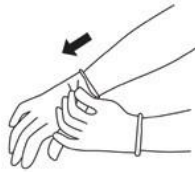
Figure 15: Putting on PPE – pre-donning instructions

## Annex 9: Taking off basic personal protective equipment

• PPE should be removed in an order that minimizes the risk of self-contamination

• Gloves, aprons (and eye protection if used) should be taken off in a dedicated doffing area

**1** Remove gloves. Grasp the outside of glove with the opposite gloved hand; peel off.  
Hold the removed glove in the remaining gloved hand.



Slide the fingers of the un-gloved hand under the remaining glove at the wrist.



Peel the remaining glove off over the first glove and discard.

**2** Clean hands.



**3** Apron.  
Unfasten or break apron ties at the neck and let the apron fold down on itself.



Break ties at waist and fold apron in on itself - do not touch the outside - this will be Contaminated. Discard.



**4** Remove eye protection if worn.  
Use both hands to handle the straps by pulling away from face and discard.



**5** Clean hands



Remove mask



**6** Untie or break bottom ties, followed by top ties or elastic, and remove by handling the ties only. Lean forward slightly. Discard. DO NOT reuse once removed.

**7**

Clean hands with soap and water.



Figure 16: Taking off basic PPE



## Annex 10: Steps to put on personal protective equipment (PPE) including coverall

### Steps to put on personal protective equipment (PPE) including coverall

**1** Remove all personal items (jewelry, watches, cell phones, pens, etc.)



**2** Put on scrub suit and rubber boots<sup>1</sup> in the changing room.

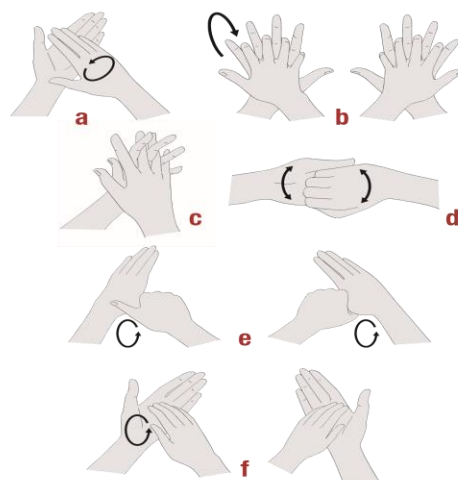


**3** Move to the clean area at the entrance of the isolation unit.

**4** By visual inspection, ensure that all sizes of the PPE set are correct and the quality is appropriate.

**5** Undertake the procedure of putting on PPE under the guidance and supervision of a trained observer (colleague).

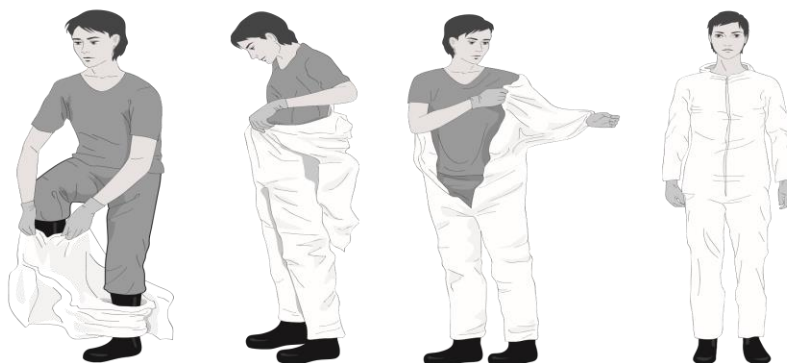
**6** Perform hand hygiene.



**7** Put on gloves (examination, nitrile gloves).



**8** Put on coverall.<sup>2</sup>



**9** Put on face mask.



**10** Put on face shield OR goggles.



OR



**11** Put on head and neck covering surgical bonnet covering neck and sides of the head (preferable with face shield) OR hood.



OR



**12** Put on disposable waterproof apron (if not available, use heavy duty, reusable waterproof apron).



**13** Put on second pair of (preferably long cuff)<sup>2</sup> gloves over the cuff.



<sup>1</sup> If boots are not available, use closed shoes (slip-ons without shoelaces and fully covering the dorsum of the foot and ankles) and shoe covers (nonslip and preferably impermeable)

<sup>2</sup> Do not use adhesive tape to attach the gloves. If the gloves or the coverall sleeves are not long enough, make a thumb (or middle finger) hole in the coverall sleeve to ensure that your forearm is not exposed when making wide movements. Some coverall models have finger loops attached to sleeves.



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Figure 17: Steps to put on PPE including coverall

# Annex 11: Steps to take off personal protective equipment (PPE) including coverall

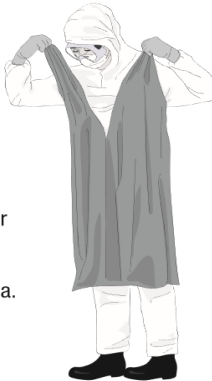
## Steps to take off personal protective equipment (PPE) including coverall

**1** Always remove PPE under the **guidance and supervision of a trained observer** (colleague). Ensure that infectious waste containers are available in the doffing area for safe disposal of PPE. Separate containers should be available for reusable items.

**2** Perform **hand hygiene** on gloved hands.<sup>1</sup>

**3** Remove **apron** leaning forward and taking care to avoid contaminating your hands.

When removing disposable apron, tear it off at the neck and roll it down without touching the front area. Then untie the back and roll the apron forward.



**5** Remove **head and neck covering** taking care to avoid contaminating your face by starting from the bottom of the hood in the back and rolling from back to front and from inside to outside, and dispose of it safely.



OR

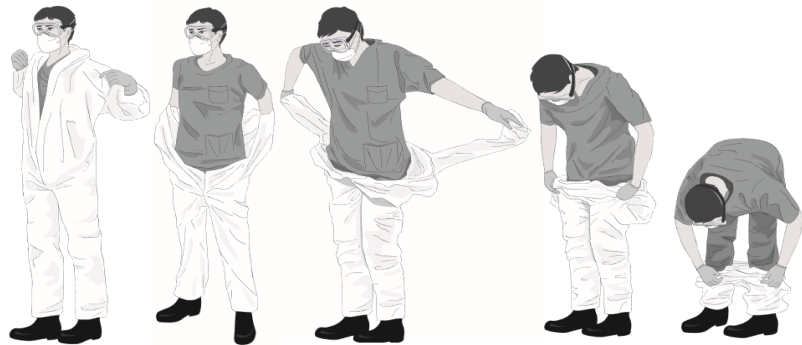


**4** Perform **hand hygiene** on gloved hands.

**6** Perform **hand hygiene** on gloved hands.

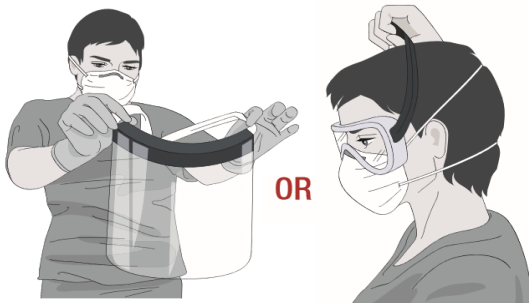
**7** Remove **coverall and outer pair of gloves**:

Ideally, in front of a mirror, tilt head back to reach zipper, unzip completely without touching any skin or scrubs, and start removing coverall from top to bottom. After freeing shoulders, remove the outer gloves<sup>2</sup> while pulling the arms out of the sleeves. With inner gloves roll the coverall, from the waist down and from the inside of the coverall, down to the top of the boots. Use one boot to pull off coverall from other boot and vice versa, then step away from the coverall and dispose of it safely.



**8** Perform **hand hygiene** on gloved hands.

**9** Remove **eye protection** by pulling the string from behind the head and dispose of it safely.



OR

**11** Remove the **mask** from behind the head by first untying the bottom string above the head and leaving it hanging in front; and then the top string next from behind head and dispose of it safely.



**12** Perform **hand hygiene** on gloved hands.

**10** Perform **hand hygiene** on gloved hands.

**13** Remove rubber **boots** without touching them (or overshoes if wearing shoes). If the same boots are to be used outside of the high-risk zone, keep them on but clean and decontaminate appropriately before leaving the doffing area.<sup>3</sup>

**14** Perform **hand hygiene** on gloved hands.

**15** Remove **gloves** carefully with appropriate technique and dispose of them safely.



**16** Perform **hand hygiene**.

<sup>1</sup> While working in the patient care area, outer gloves should be changed between patients and prior to exiting (change after seeing the last patient)  
<sup>2</sup> This technique requires properly fitted gloves. When outer gloves are too tight or inner gloves are too loose and/or hands are sweaty, the outer gloves may need to be removed separately, after removing the apron.  
<sup>3</sup> Appropriate decontamination of boots includes stepping into a footbath with 0.5% chlorine solution (and removing dirt with toilet brush if heavily soiled with mud and/or organic materials) and then wiping all sides with 0.5% chlorine solution. At least once a day boots should be disinfected by soaking in a 0.5% chlorine solution for 30 min, then rinsed and dried.



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Figure 18: Steps take off PPE including coverall

**Table 64: Clinical Syndromes/Conditions Warranting Empiric Transmission-Based**

Clinical Symptom or Condition	Empiric TBPs <sup>1</sup>	Duration of Precaution <sup>2</sup>	Additional symptoms <sup>3</sup>	Potential pathogens based on additional symptoms <sup>4</sup>	Potential Pathogen-Specific	Duration/Comments for potential pathogen-specific precautions
<b>DIARRHEA:</b> Acute diarrhoea with a likely infectious cause in an incontinent or diapered patient	<b>C</b>	Duration of Illness	Fever, malaise, anorexia, nausea, abdominal discomfort	Hepatitis A virus	<b>C</b>	Infants and children <3 years age = duration of hospitalization; children 3-14yrs = 2 weeks after symptom onset; > 14yrs = 1 week after onset of symptoms
			Nausea, Vomiting	Enteric pathogens (e.g., <i>C. difficile</i> , <i>Cholera</i> , <i>Escherichia coli</i> O157:H7, Noroviruses, Rotavirus, <i>Shigella spp</i> )	<b>C</b>	Duration of Illness or to control institutional outbreaks
<b>MENINGITIS:</b> Fever, headache, neck stiffness, altered mental status, nausea/ vomiting	<b>ALL</b>	Duration of 24 hours or until patient has three negative sputum smears for AFB	Coryza, pharyngitis, exanthem, myositis	Enteroviruses	<b>C</b>	For infants and children
			Cough, fatigue, night sweats, weight loss, pleuritic pain	<i>M. tuberculosis</i>	<b>S</b>	Duration is until patient has three negative sputum smears for AFB OR if an- other diagnosis explains clinical syndrome.  If pulmonary infiltrate then <u>Airborne Precautions</u> . If potentially infectious draining body fluid pre- sent, <u>Airborne &amp; Contact Precautions</u> .
			Photophobia	<i>Neisseria meningitidis</i>	<b>D</b>	<u>Droplet Precautions</u> for first 24 hours of antimicrobial therapy; mask and face protection for intubation. Postexposure chemoprophylaxis for household contacts, HCWs exposed to respiratory secretions; postexposure vaccine only to control outbreaks.
<b>RASH Or EXANTHEMS</b>	<b>ALL</b>	D for 24 hours then C for 3 weeks, or duration of illness if illness is longer than 3 weeks	Petechial/ecchymotic With fever (general) & If positive history of travel to an area with an ongoing outbreak of VHF In the 10 days before onset of fever	Ebola, Lassa, Marburg viruses (see also next section)	<b>C&amp;D</b>	For duration of illness. Contact & Droplet Precautions, with face/eye protection, emphasizing safety sharps and barrier precautions when blood exposure likely. Use N95 or higher respiratory protection when aerosol generating procedure performed
			Maculopapular with cough, coryza, and fever	Rubeola (measles) virus	<b>A</b>	Duration of 4 days after rash onset and for duration of illness for immunocompromised. Immune HCWs preferable. Higher respiratory protection when aerosol generating procedure performed. Exposed HCWs must be excluded from exposure to day 21 after last exposure, regardless of post- exposure vaccine

Clinical Symptom or Condition	Empiric TBPs <sup>1</sup>	Duration of Precaution <sup>2</sup>	Additional symptoms <sup>3</sup>	Potential pathogens based on additional symptoms <sup>4</sup>	Potential Pathogen-Specific	Duration/Comments for potential pathogen-specific precautions
			Petechial/ecchymotic with Fever (general)	Neisseria meningitidis	<b>D</b>	Droplet Precautions for First 24 hours of antimicrobial therapy; mask and face protection for intubation. Post exposure Chemoprophylaxis for household contacts, HCWs exposed to respiratory secretions; post exposure vaccine only to control outbreaks.
			Vesicular	Herpes simplex	<b>C&amp;A</b>	Until lesions dry and crusted
			Vesicular	Varicella-zoster (shingles)	<b>C&amp;A</b>	Duration of illness. Immune HCWs preferable
			Vesicular	Variola (smallpox)	<b>C&amp;A</b>	Airborne and contact precautions for duration of illness which is until all scabs have crusted and separated approximately 3-4 weeks. Immune HCWs preferable
			Vesicular	Vaccinia viruses	<b>C</b>	Until lesions dry and crusted, scabs separated. Vaccinated HCWs preferable.
<b>RESPIRATORY INFECTIONS:</b> Cough, fever, pulmonary infiltrate	<b>ALL</b>	Longest period of time from either: 5 days from onset of symptoms, duration of illness, or until patient has three negative sputum smears for AFB	Cough/fever/pulmonary infiltrate in any lung location	<i>M. tuberculosis</i> , Respiratory viruses, <i>S. pneumoniae</i> , <i>S. aureus</i> (MSSA or MRSA)	<b>D &amp; A</b>	Duration is until patient has three negative sputum smears for AFB OR if another diagnosis explains clinical syndrome  Use eye/face protection if aerosol-generating procedure performed or contact with respiratory secretions anticipated. If <i>M. tuberculosis</i> unlikely and no respirators available, use Droplet Precautions instead of Airborne Precautions if patient is HIV-positive
			Cough/fever/pulmonary infiltrate in any lung location in a patient with a history of recent travel (10-21 days) to countries with active outbreaks of SARS, avian influenza	<i>M. tuberculosis</i> , severe acute respiratory syndrome virus (SARS-CoV), avian influenza	<b>D &amp; A</b>	Duration is until patient has three negative sputum smears for AFB OR if another diagnosis explains clinical syndrome. If pulmonary infiltrate then <u>Airborne Precautions</u> . If potentially infectious draining body fluid present, <u>Airborne &amp; Contact Precautions</u> . Include eye protection. If SARS and tuberculosis unlikely, use <u>Droplet Precautions</u> instead of Airborne Precautions
				SARS-CoV-2	<b>C, D, A</b>	In addition to standard precautions, all individuals, including HCWs and caregivers, should use contact and droplet precautions before entering room where suspected or confirmed COVID-19 patients are admitted. Contact and droplet precautions should only be discontinued in consultation with clinicians and should take into consideration resolution of clinical signs and symptoms, or the number of days since a positive test was carried out with an upper respiratory specimen by molecular assay. For symptomatic patients, these

Clinical Symptom or Condition	Empiric TBPs <sup>1</sup>	Duration of Precaution <sup>2</sup>	Additional symptoms <sup>3</sup>	Potential pathogens based on additional symptoms <sup>4</sup>	Potential Pathogen-Specific	Duration/Comments for potential pathogen-specific precautions
						additional precautions can be discontinued 10 days after symptoms onset AND at least three consecutive days with neither fever nor respiratory symptoms. For asymptomatic patients, isolation can end 10 days after the initial positive RT-PCR test result
			Respiratory infections, particularly bronchiolitis and pneumonia, in infants and young children	Adenovirus, Human metapneumovirus, Influenza virus, parainfluenza virus, Respiratory syncytial virus	<b>C &amp; D</b>	5 days from onset of symptoms or duration of illness-whichever time period is longer. May need <u>Contact &amp; Droplet Precautions</u> . <u>Droplet Precautions</u> may be ruled out when adenovirus and influenza has been ruled out.
<b>SKIN or WOUND INFECTION</b>	<b>C &amp; D</b>	Up to 24 hours	Abscess or draining wound that cannot be covered	<i>Staphylococcus aureus</i> (MSSA or MRSA), group A streptococcus	<b>C &amp; D</b>	<i>Contact &amp; Droplet Precautions</i> for the first 24 hours of appropriate antimicrobial therapy if invasive Group A streptococcal disease is suspected

*\*Infection control professionals should modify or adapt this table according to local conditions. To ensure that appropriate empiric precautions are implemented always, hospitals must have systems in place to evaluate patients routinely according to these criteria as part of their preadmission and admission care.*

1. Most conservative set of Transmission-based Precautions and Duration of Precaution use, based on Clinical Symptom
2. Based on CDC's 2007 "Guidelines for Isolation Precautions", Heymann's 19th edition "Control of Communicable Diseases Manual", and the "Red Book: 2009 Report of the..... XXX
3. S= Standard but has specific Transmission-Based Precautions based on additional symptoms; C= Contact; D= Droplet; A= Airborne; ALL= Contact, Droplet, & Airborne Precautions
4. The organisms listed under the column "Potential Pathogens" are not intended to represent the complete, or even most likely diagnoses, but rather possible etiologic agents that require additional precautions beyond Standard Precautions until they can be ruled out.
5. If in doubt, duration of the empiric precautions is usually the duration of symptoms or the duration of the specific disease if final diagnosis is reached