



**THE NATIONAL
INFECTION PREVENTION AND CONTROL
GUIDELINES
FOR LONG-TERM CARE FACILITIES**

2018

This document serves as an in-use consultation document for one year (Until September 2019) for residential long-term care facilities in Singapore.

Future versions of this document will be updated to include guidance for chronic sick units, palliative care/hospices, sheltered homes as well as non-residential and ambulatory long term care settings.

FOREWORD

It is with pleasure that we present this first edition of the National Infection Prevention and Control Guidelines for Long-Term Care Facilities (LTCFs). There have been prior guidelines but none as comprehensive targeted at LTCFs specifically and addressing issues encountered (and causing confusion) today.

In dedicating this guideline to LTCFs (excluding acute and community hospitals), we have been able to distinguish the different aims of the setting and the objectives of Infection Prevention and Control (IPC) programmes. We hope the guidelines that follow, while predominantly targeting nursing homes (NH) will also be adaptable to all forms of long term care both residential and non-residential. Nonetheless, future versions of this document will be updated to include guidance specific guidance for chronic sick units, hospices, palliative care, as well as non-residential and ambulatory long term care settings.

A major point of clarity is the fact that nursing home residents are not “patients” and that this setting is their home. As such, successful segregation and other extraneous IPC interventions are not practical. We therefore recommend that special measures for MDROs not be undertaken. The prevalence of MDROs in nursing homes is much higher than those known about, yet the rate of clinical infections is very low. Efforts at transmission control need to be a part of practice and not targeted toward any individual or organism. Likewise, efforts to prevent colonisation becoming an infection will benefit from enhancement.

The contents to follow are structured to align with a recent document from the WHO describing the core components of an IPC programme. All LTCFs have IPC policies. As these policies are reviewed we suggest that that they take a similar structure to ensure comprehensiveness.

We welcome any feedback that will help improve the guideline moving forward.

Yours Sincerely,

Prof Dale Fisher

Chairperson

National Infection Prevention and Control Committee (NIPC)

ACKNOWLEDGEMENT

The *National Infection Prevention and Control (IPC) Guidelines for Long Term Care Facilities 2017* has been formulated under the National Infection Prevention and Control Committee (NIPC) (Table 0.1). There has been extensive discussion and collaboration with Singapore's experts in IPC based clinically in acute healthcare facilities and LTCFs, Ministry of Health (MOH) and the Agency for Integrated Care (AIC). Worthy of special mention is the guidelines drafting workgroup of experts led by Dr Ling Moi Lin (Table 0.2).

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ABBREVIATIONS AND GLOSSARY

ABHR	Alcohol Based Hand Rub
AIC	Agency for Integrated Care
BI	Biological indicator
CAUTI	Catheter-Associated Urinary Tract Infections
CP-CRE	Carbapenemase Producing Carbapenem Resistant <i>Enterobacteriace</i>
FTE	Full-time Equivalent
HAI	Healthcare-associated infection
HCW	Healthcare Workers
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HEPA	High Efficiency Particulate Air
HIV	Human Immunodeficiency Virus
HVAC	Heating, Ventilation and Air Conditioning
IMC	Intermittent Self-Catheterisation
ICRA	Infection Control Risk Assessment
IPC	Infection Prevention and Control
LTCF	Long Term Care Facility
MDRO	Multi-Drug Resistant Organism
MMR	Measles, Mumps, Rubella
MOH	Ministry of Health, Singapore
MRSA	Methicillin-resistant <i>Staphylococcus aureus</i>
MSF	Ministry of Social and Family Development
NEA	National Environment Agency
NIOSH	National Institute of Occupational Safety and Health
NIPC	National Infection Prevention and Control Committee
NSI	Needle-Stick Injury
PEP	Post Exposure Prophylaxis
PPE	Personal Protective Equipment
QUATs	Quaternary Ammonium Compounds
TB	Tuberculosis
UTI	Urinary Tract Infection
VRE	Vancomycin-resistant <i>Enterococcus</i>

Tracheostomy - is a common procedure by which an external stoma is created on the anterior surface of the trachea through a surgical incision. This stoma is to aid in airway obstruction by bypassing the upper airway, for prolonged assistance in ventilation and to facilitate the removal of respiratory secretions.

Pre-oxygenation – refers to the administration of oxygen before suctioning.

Hyper-oxygenation – refers to the administration of oxygen at a concentration higher than the amount the resident usually receives or requires.

Humidification – defined as increasing the moisture content of the inspired air.

CHAPTER 1 GOVERNANCE AND MANAGEMENT

The effectiveness of IPC in LTCFs is founded upon its dedicated resources, documented expectations, accountabilities, an annual work plan and reporting lines. All LTCFs should have a policy describing their governance structure and how the requirements outlined through this chapter are met. These policies should be regularly reviewed and updated.

The core components of an effective IPC programme are covered in the chapters below. They include standard and transmission based precautions, surveillance, triggers and outbreak response procedures, education of employees in infection prevention, an employee health programme, a nursing resident's health programme (e.g. immunisation), and monitoring of such practices. In addition, other aspects of the programme should include quality improvement, resident safety, environmental hygiene, product evaluation, and surveillance and reporting of reportable infectious diseases to the Ministry of Health (MOH). The responsibility of all such components within the facility should be clear in the facility's governance and management policy.

1.1. **Dedicated IPC Personnel**

Dedicated IPC personnel are an essential component of an effective infection prevention and control programme, and are responsible for implementation and execution of the IPC programme in the LTCF. IPC personnel are usually staff with a nursing qualification that often take on other duties, such as assistant director of nursing, charge nurse, in-service coordinator, and health nurse or quality improvement officer. The number of LTCF beds justifying a full-time IPC staff member depends on the acuity level of residents and the level of care provided. Each LTCF (unless <250 beds) should have 1.0 full-time equivalent (FTE) staff dedicated to IPC (which could be spread across more than 1 individual). Larger facilities would require more FTEs dedicated to IPC. The facility may choose to designate ward based infection control liaison nurses/officers to act as ward IPC champions.

All LTCF IPC personnel should receive professional training in IPC and have support from the LTCFs leadership. In addition to the professional qualifications, the IPC personnel should have:

- a) Knowledge and experience in areas of resident care practices, microbiology, asepsis, disinfection/sterilisation, infectious diseases, communication, programme administration, and epidemiology;
- b) Undergone a basic infection prevention and control training course; and

- c) Continuous education on current knowledge and skills in the area of infection prevention and control as well as basic epidemiology.

1.2. IPC Committee

IPC issues in the LTCF should be overseen by an IPC committee. The committee should be multi-disciplinary and consist of the:

- a) LTCF leadership (i.e. medical director and nursing leaders);
- b) Relevant stakeholders i.e. representative members from key areas such as food services, maintenance, housekeeping and allied health professionals;
- c) IPC personnel; and
- d) IPC doctors (if available).

See recommended structure of an IPC committee in [Table 1.1](#).

The IPC committee may be in the same team as the quality improvement or resident safety programme committees, but IPC must be identified as a distinct programme within the committee. The committee should meet regularly (at least six monthly) and review the LTCF's IPC surveillance data, policies and programme goals and activities. Written records of the IPC committee meetings should be kept and made readily available for licensing audits.

Table 1.1: LTCF Infection Prevention and Control Committee Structure

Members	Representatives	Role(s)
Core members	LTCF leadership including Nursing leaders, Medical Directors and IPC Committee chairperson	<ul style="list-style-type: none"> • Identify infection transmission risks
Representative members	Food Service, Maintenance, Housekeeping, Laundry Services, Clinical Services, Physiotherapy, Occupational Health representative, Employee Health/Human Resource	<ul style="list-style-type: none"> • Establish priorities and strategies for IPC • Follow up on IPC initiatives • Implementation plans • Develop IPC policies/procedures • Allocate resources • Assess IPC programme efficiency at least annually
IPC staff	Dedicated IPC personnel, IPC liaison nurses/officers and IPC doctors	<ul style="list-style-type: none"> • Surveillance • Data collection and analysis • Implementation of policies, procedures • IPC training and promotion to all staff • Reporting to NIPC as needed • Communication to MOH • Communication to other agencies • Communication to other facilities

1.3. Performance/Quality Improvement/Resident Safety

The increased emphasis on quality indicators in health care is becoming evident in LTCFs. Quality assessment and improvement tools, such as data collection and analysis tools, may be used in IPC to help assess performance for improvement. Examples of such indicators include catheter-associated urinary tract infection or device-associated soft tissue/wound infection. Please refer to the Agency for Integrated Care's guide to basic safety quality indicators for list of indicators currently being tracked for the purpose of improvement in nursing homes.

1.4. Pandemic Preparedness Planning

IPC personnel should play a key role in the LTCF's IPC preparedness planning and risk assessment. The LTCF should be prepared in the detection, management and response to outbreaks. Issues to be considered include surge capacity, medication availability and rationing, stockpiling, staff shortages and communication with MOH.

1.5. Recommendations

- a) Each LTCF should have a written policy describing how the guidelines in this chapter are to be met.
- b) Healthcare settings must evaluate their IPC needs and implement an IPC programme suited to those needs.
- c) Periodic review of the IPC programme must be carried out to evaluate the organization's needs and determine the elements required to meet the goals of the IPC programme in the LTCF.
- d) Support from leadership and the IPC committee should be sought for the implementation and execution of the IPC programme by specified personnel.
- e) Each LTCF should have a multi-disciplinary IPC committee whose responsibilities include annual goal-setting, programme evaluation and ensuring that the IPC programme meets current legislated standards and requirements, as well as the needs of the facility.
- f) LTCFs should monitor targeted IPC processes with regular audits of practices.
- g) LTCFs should monitor targeted IPC outcomes using surveillance for healthcare-associated infections in high risk populations.
- h) Healthcare-associated Infection surveillance must be undertaken with standardized collection methodologies using written definitions of infections, identification of risk population, methods of measurement, description of data sources and benchmarks used for comparison.

- i) Results of process and outcome surveillance must be analysed and reviewed in a timely manner. A plan for improvement, including organizational accountability, must be developed by the targeted area in conjunction with IPC staff based on the results of surveillance.

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<http://www.pandemicflu.gov/plan/healthcare/longtermcarechecklist>

For Consultation

CHAPTER 2 HUMAN RESOURCE MANAGEMENT

In LTCFs, there is an increased risk of staff exposure to residents with infectious diseases such as herpes zoster, scabies, conjunctivitis, influenza, TB, viral gastroenteritis and many vaccine preventable conditions. Healthcare workers (HCWs) are at risk of being infected with communicable diseases, due to the close contact that they have with infectious residents or the residents' specimens during the course of their work. Appropriate immunisation can help safeguard the health of HCWs, and reduces the risk of nosocomial infections from vaccine-preventable diseases among HCWs and susceptible residents. An essential part of successful staff health programmes is ensuring that HCWs are immune to vaccine-preventable diseases.

A comprehensive staff immunisation programme is more cost-effective than case management and outbreak control. To ensure susceptible staff are vaccinated, the immunisation programmes should be mandatory for all staff rather than voluntary. The LTCF should maintain evidence of the immunity status of its staff.

LTCFs should have a written policy outlining the processes which protect staff from occupational hazards. It should consist of staff training in IPC, including the principles and processes specific to that LTCF, hand hygiene, precautions, PPE and mask fitting. A policy on sharps and other body fluid exposures prevention and management should also be in place. The LTCF should clearly describe how staff with an infectious disease (e.g. diarrhoea or respiratory illness) should be managed.

2.1 **IPC Training**

All LTCF staff should receive basic training in IPC. Such training includes IPC theory and practices appropriate to the LTCF. A structured IPC training should be part of the orientation programme for all new employees, and regular on-going IPC trainings should be conducted for all staff, especially for staff providing direct resident care.

Residents and families should also receive education on basic hygiene, transmission precautions and hand hygiene during routine care. If possible, resident and family education practices should be incorporated in the staff orientation programme.

Medical practitioners and management staff at LTCFs are required to be familiar with Singapore's Infectious Disease Act (Link: <https://sso.agc.gov.sg/Act/IDA1976>). Notifiable

infectious diseases should be reported at the earliest opportunity: within 72 hours from the time of clinical suspicion or laboratory diagnosis, except for some infectious diseases which need to be notified within 24 hours as urgent public health action is required.

LTCFs should have a written workflow on escalating and reporting of infectious diseases of public health importance to MOH. It is also important to note that MOH reviews and adjusts the list of infectious diseases of public health importance from time to time as the risk assessment changes.

2.2 Staff Vaccination

All HCWs should have documented serological evidence of immunity for varicella or documented proof of vaccination (i.e. 2 doses of varicella vaccine at least 28 days apart). Self-declaration of past infection or vaccinations is not recognised as evidence of immunity. All LTCF staff who are non-immune to chicken pox or measles, mumps, rubella (MMR) should be vaccinated.

2.2.1 *Hepatitis B*

Hepatitis B vaccination should be offered to non-immune HCWs with direct resident contact and therefore have an occupational risk of exposure to blood. Administrative staff, such as receptionists, billing staff, and general office workers, are not required to be vaccinated. HCWs with no serological evidence of immunity against Hepatitis B should be vaccinated with the primary course series (i.e. 3 doses of Hepatitis B vaccine). Post-vaccination serology tests should be conducted to determine the concentration of protective antibodies i.e. anti-HBs of at least 10 mIU/mL. For those who have a documented serology response (i.e. anti-HBs more than 10 mIU/mL), there is no need to repeat hepatitis B screening in the future.

2.2.2 *Influenza*

All LTCF staff should be vaccinated annually for seasonal influenza. This could be a part of a resident vaccination programme.

2.2.3 *Tuberculosis*

Tuberculosis (TB) may present in LTCFs through reactivation of latent infection in residents or through that of HCWs (particularly those from countries with highly prevalent disease). It is important to be aware of often subtle presentations including prolonged cough,

fever, weight loss and later haemoptysis and shortness of breath. Screening for latent disease in asymptomatic residents is not recommended.

LTCFs should not manage suspected active TB cases. Staff or residents with suspected TB should be transferred to an appropriate acute healthcare facility for evaluation. The LTCF should ensure a referral agreement with the acute healthcare facility. Staff and residents with suspected TB should be isolated and wear a surgical mask before and during transfer. Medical leave is indicated for staff with suspect disease until TB is excluded or disease is treated and deemed no longer infectious by their treating physician.

All staff and volunteers should be given up-to-date information about the risks of contracting TB and how they can protect themselves from acquiring TB infection. They should be educated on TB symptoms and seek advice from health facilities if symptoms develop. Residents and staff should be encouraged to practice cough etiquette by covering their mouths when coughing, disposing used tissue after use and performing subsequent hand hygiene.

2.3 Prevention and Management of Blood and Body Fluid Exposure (including sharps exposure)

Staff are at risk of blood borne virus transmission when exposed to blood or body fluids of an infected resident. All body fluids should be regarded as infected. One needle stick injury (NSI) from an infected source individual has a risk of 30%, 1.8%, and 0.3% of causing Hepatitis B Virus (HBV), Hepatitis C Virus (HCV) and Human Immunodeficiency Virus (HIV) infection respectively.

In order to minimize the risk of NSI, needles and sharps should be handled with caution. The following pointers on safe use and proper disposal of sharps should be practised:

- a) Safety engineered sharps should be used if possible;
- b) Minimize handling of needles and sharps;
- c) Sharps should not be passed directly from hand to hand. Instead use a neutral zone for the staff to pick up the sharp instrument (e.g. a tray);
- d) Used needles must not be bent, recapped or removed from syringes before disposal;
- e) Use the scoop method or “one-hand recapping technique” in situations where recapping of a needle is necessary;
- f) All sharps must be discarded in an appropriate closed, puncture resistant container which has to be kept upright throughout use and disposal;

- g) The sharps container should be located in a safe position and height that allows safe sharps disposal and to avoid spillage; and
- h) The sharps container should be replaced routinely and must not be overfilled.

Blood and Body Fluid exposure is an injury or incident involving direct skin contact with body fluids or substances where skin integrity is compromised (e.g. an open wound, abrasion or needle prick) or direct mucous membrane contact. Following any exposure, the wound should be washed thoroughly with soap and water immediately. Avoid using alcohol, hydrogen peroxide, Betadine or other chemical cleansers. Wound should not be squeezed or sucked. For mucosal contact, e.g. spillage into the conjunctivae, the exposed area should be immediately flushed with clean running water.

The exposed HCW should report the incident and seek immediate medical advice for proper wound care and post-exposure management, in accordance with individual LTCF guidelines and protocols.

The exposed individual should have a medical evaluation. A risk assessment will be undertaken which may require blood investigations from the source. Post exposure prophylaxis (PEP) and counselling maybe required should the source be positive or at high risk for a blood borne virus. If an occupational exposure to an HIV source resident occurs, it should be considered as an urgent medical concern and review should ensue within 24 hours of the exposure.

The LTCF should have a reporting protocol for the management of sharps injuries and blood and body fluids exposure. It is the responsibility of the LTCF to advocate all HCWs on the reporting process so as to expedite the flow, allowing the attending doctor to evaluate and provide appropriate post-exposure treatment swiftly. It is advisable to have an exposure events monitoring system in place to prevent similar incidents from occurring in the future.

In summary, the exposed HCW should:

- a) Wash the puncture site immediately with soap and water and dress the wound;
- b) If blood or body fluid splashed into the eye, irrigate with running water;
- c) Report incident to the Supervisor / Senior Nurse on duty;
- d) Seek medical help at the emergency department (A&E) at an acute healthcare facility; and
- e) Ensure accurate documentation of the incident.

For cleaning of blood and body fluid spills please refer to Chapter 7.

2.4 Staff Sickness

All sick staff especially those with direct contact with residents should be excused from work until they are well. Efforts should be made to keep sick staff away from well staff, even out of working hours. Staff includes clinical, administrative, support, contract employees as well as volunteers. In addition, cough etiquette, use of surgical mask and hand hygiene are useful in preventing disease transmission. LTCFs should keep a record of staff illness to identify transmission of disease among staff or between staff and residents.

2.5 Recommendations

- a) Each LTCF should have a written policy describing how the guidelines in this chapter are to be met
- b) Education in IPC must span the entire setting and all staff.
- c) An IPC component should be part of the orientation programme for new staff.
- d) All health care facilities must have trained IPC personnel and resources to implement the IPC programme that are proportional to the size, complexity, case mix and estimated risk of the populations served by the health care facility.
- e) All LTCFs should have an immunisation programme in place for HCWs based on their exposure risk to communicable diseases in their work and environment.
- f) LTCFs should maintain proper vaccination records of all staff and ensure vaccination coverage for HCWs.
- g) LTCFs can consider using safer sharp devices; e.g. shielded needles or needless devices as much as possible.
- h) Train and assess all users in the correct use and disposal of sharps and sharps safety devices.
- i) LTCFs should have a needle stick injury protocol which includes reporting of sharps injuries and sharps preventive management guidelines.
- j) Provide regular education and training for HCWs on sharps injury prevention.
- k) Standard precautions are encouraged as the key method for preventing exposure to blood and body fluids. This includes the routine use of Personal Protective Equipment (PPE) according to anticipated exposures.
- l) LTCF staff must be trained in dealing with blood or body fluids spills.

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CHAPTER 3 INFECTION PREVENTION AND CONTROL PRECAUTIONS

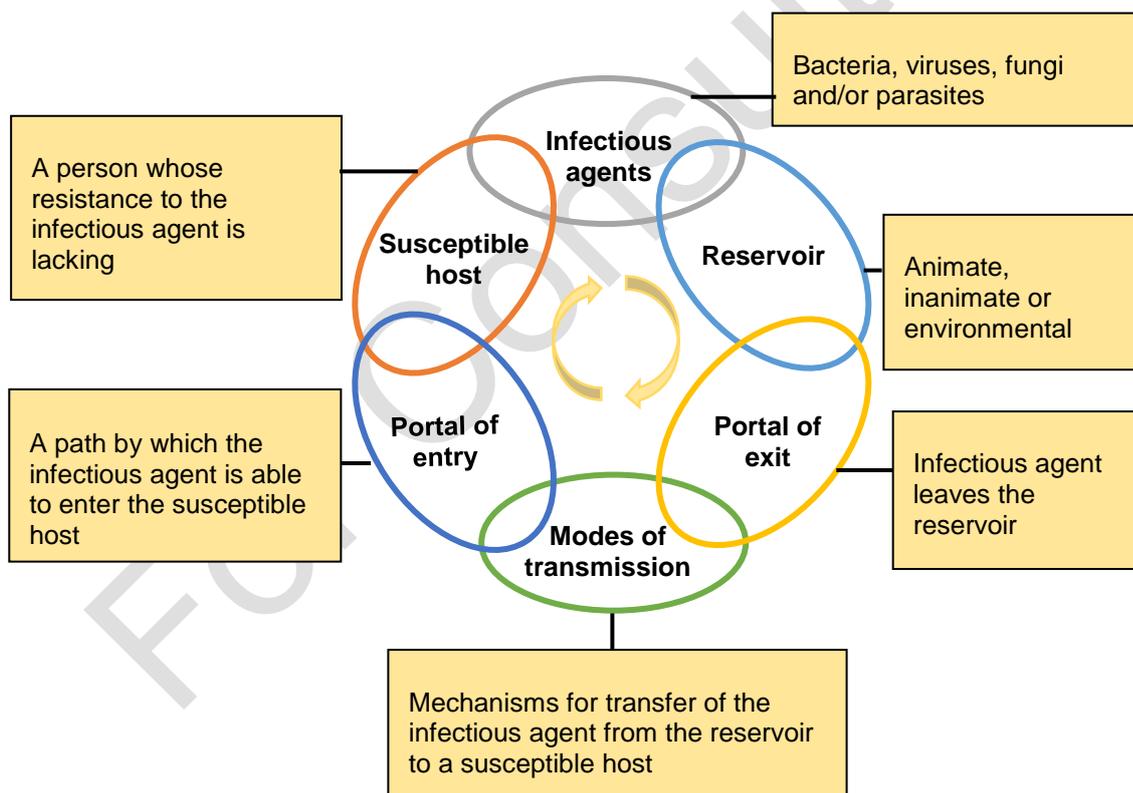
This chapter describes IPC precautions and their impact on the epidemiology of healthcare associated infections (HAIs) in the LTCFs.

3.1 Chain of Infection

The chain of infection is the model used to describe how infections move from one person to another within a healthcare setting. It is a key concept in infection prevention and control. Transmission will not take place unless all 6 of the elements in the chain of transmission are present. Each link in the chain represents a factor related to the spread of microorganisms.

Figure 3.1: Six Elements of the Chain of Infection

(Adapted from the National IPC Guidelines for Acute Healthcare Facilities, 2017)



For an infection to develop, each link of the chain must be connected. Breaking any link of the chain can stop the transmission of infection.

3.2 Infectious Agents

Infectious agents are transmitted via human sources and contaminated environment. Human reservoirs include residents, healthcare workers (HCWs) and visitors. These

individuals may have active symptomatic infections, asymptomatic infections, carrier states or be in the incubation period of an active infectious disease.

The main types of micro-organisms causing human infection include:

- a) Bacteria (e.g. *Salmonella spp*)
- b) Viruses (e.g. Hepatitis A, B or C viruses)
- c) Fungi (e.g. *Candida spp*).
- d) Parasites (e.g. Roundworms, Protozoa)

Infected people may act as a source of infection and microorganisms found in body fluids could be passed on to others. The individuals may be transiently or chronically colonized with pathogenic microorganisms, particularly in the respiratory and gastrointestinal tracts. Food and water can also be other sources of infectious agents.

3.3 Susceptible Hosts

The susceptible host is any person who is at risk of infection. Host factors such as age, underlying chronic diseases, immobility, treatments such as corticosteroids, poor functional status; incontinence, dysphagia, age related skin changes increase susceptibility to urinary, respiratory, cutaneous and soft tissue infections. Malnutrition can also impair wound healing and therefore increases the risk of infection.

Residents need to be assessed on the risk factors for acquiring infections. Elderly with illnesses such as diabetes mellitus, chronic respiratory diseases, cancer, weakened immune system, and breaks in the skin have increased risk of acquiring infection. Residents can reduce the risk of infection by ensuring good oral hygiene, hydration, nutrition, hand hygiene, respiratory/cough etiquette and clean environment.

3.4 Modes of Transmission

Microorganisms can be transmitted by one or more of several routes:

- a) Contact;
- b) Droplet;
- c) Airborne;
- d) Common vehicle (e.g. food); and
- e) Vector-borne (e.g. mosquitoes)

3.5 Reservoir

The place where the infectious agent resides, survives, thrives and reproduces e.g. food, water, toilet seats, door knobs, human faeces, respiratory secretions.

3.6 Portal of Exit

This refers to the place where the infectious agent leaves the reservoir e.g. respiratory tract (nose, mouth), intestinal tract (via faeces or vomitus), urinary tract or blood.

3.7 Portal of Entry

The opening where an infectious disease enters the host's body such as mucous membranes, open wounds, or tubes inserted in body cavities e.g. urinary catheters or feeding tubes.

3.8 Risk Assessment

Risk assessment should be implemented for resident interactions. Risks are assessed for:

- a) Contamination of skin or clothing by microorganisms in the resident environment
- b) Exposure to blood, body fluids, secretions, excretions and/or tissues
- c) Exposure to non-intact skin
- d) Exposure to mucous membranes
- e) Exposure to contaminated equipment or surfaces

3.9 Standard Precautions

Standard Precautions include a group of infection prevention measures that are to be applied when managing all residents at all times regardless of whether infection is present or suspected. It is based on the principle that all blood and body fluids, secretions, excretions except sweat, non-intact skin and mucous membranes may contain transmissible infectious agents.

The recommended precautions should be applied for residents known to have Human Immunodeficiency virus (HIV), Hepatitis B, Hepatitis C and other blood-borne pathogens as well. No more is needed to prevent transmission of blood borne diseases.

Standard Precautions includes the following components:

- a) Hand Hygiene

- b) Personal Protective equipment (PPE) when in potential contact with blood or body fluids
- c) Respiratory hygiene/Cough etiquette
- d) Needlestick / sharps injuries and blood or body fluid exposure prevention
- e) Safe Injection Practices
- f) Environmental Hygiene
- g) Safe handling of potentially contaminated equipment, instruments/devices
- h) Linen and waste management

3.9.1 Hand Hygiene

Hands contaminated with transient bacteria pose a significant risk for transmission of infection. The purpose of hand hygiene is to remove or destroy any bacteria picked up on the hands (transient bacteria). Hand hygiene remains the most important control measure in LTCFs, community care services, sheltered homes and other healthcare facilities. Data has shown that improved hand hygiene practices have been associated with reduced HAI rates (Refer to chapter 6 on hand hygiene).

3.9.2 Personal Protective Equipment (PPE) for Potential Blood and Body Fluid Exposure

This refers to wearable equipment that is intended to protect HCWs from exposure to infectious agents. The type of PPE used should be appropriate for the procedure being performed and the type of exposure to blood, body fluid or pathogen anticipated. PPE available includes gloves, fluid resistant gowns or aprons, masks and eye protection/ face shields.

Figure 3.2a: Donning of PPE



Figure 3.2b: Removal of PPE



(Source: Infection Prevention & Control, Singapore General Hospital, used with permission)

Gloves

Gloves should be worn whenever exposure to the following is anticipated:

Blood/blood products/body fluids with excretions and secretions;

- a) Urine;
- b) Faeces;
- c) Saliva;
- d) Mucous membranes;
- e) Wound drainage;
- f) Drainage tubes;
- g) Non-intact skin.

Gloves must not be reused. They should be put on immediately before an episode of close resident contact or treatment and removed as soon as the activity is completed. Gloves should be changed between caring for different residents, or between different care or treatment activities for the same resident. Torn, punctured or otherwise damaged gloves should not be used, and should be removed immediately if damage occurs during a procedure. Hand hygiene must be performed immediately after the removal of gloves.

Gowns/Aprons (Fluid Resistant)

Fluid resistant gowns or aprons can be selected based on the risk of exposure. They should be worn when there is potential for soiling clothing with blood/body fluids, secretions and excretions, or when there is a risk that clothing may be contaminated with pathogenic micro-organisms. Gowns/aprons should be changed between residents and procedures. It may be also necessary to change gowns/aprons between tasks on the same resident to prevent unnecessary cross-contamination.

Masks and eyewear (e.g. face shields, goggles)

Masks and eyewear should be worn during procedures where there is potential blood/body fluids exposure to the face and eyes. Well fitted, fit for purpose and comfort of the mask/eyewear is important to ensure adequate protection. Mask/eyewear protection should not be touched while being worn and should be removed and disposed of immediately following a procedure. If non-disposable goggles/face shields are used, LTCFs should ensure that there is a decontamination process established.

3.9.3 Respiratory Hygiene/Cough Etiquette

The purpose of respiratory hygiene is to prevent the transmission of respiratory infections. It is recommended that visual alerts be posted at appropriate locations to inform staff, residents and visitors to practise respiratory hygiene/cough etiquette.

The following respiratory hygiene/cough etiquette measures to contain respiratory secretions are recommended for individuals with symptoms.

- a) Cover the nose/mouth when coughing or sneezing;
- b) Use tissues to contain respiratory secretions and dispose of them in the nearest waste receptacle after use; and
- c) Perform hand hygiene (e.g. handwashing with non-antimicrobial soap and water, alcohol-based hand rub, or antiseptic handwash) after having contact with respiratory secretions and contaminated objects/materials.

Staff should teach respiratory hygiene/cough etiquette to residents, family members and visitors as needed.

3.9.4 Safe Injection Practices

Prevention of contamination of injection equipment and medication can prevent an outbreak. Staff should practise strict adherence to basic principles of aseptic technique for the preparation and administration of parenteral medications.

Sterile, single-use, disposable needle and syringe must be used for each injection. Expiration/discard dates should be checked prior to use, and a visual inspection should be conducted to look for signs of contamination, including cloudiness or visible particles. Discard vial if visible contamination is seen or if sterility is questionable. The rubber septum on a medication vial should be disinfected using 70% alcohol swab and allowed to dry immediately prior to puncturing with a sterile needle to draw the medication.

Used of single-dose vials should be used whenever possible. If used, multi-dose vials should be, where possible, dedicated for a single resident and stored with the dedicated resident's medication supplies. Multi-dose vial should be labelled with resident's details and dated when first opened. It is also important to store multi-dose vials properly and safely following manufacturer's instruction. Once opened, multi-dose vials should be discarded within 28 days unless otherwise specified by the manufacturer.

3.9.5 Environmental Hygiene

Cleaning and disinfecting non-critical surfaces in resident care areas are part of standard precautions. The cleaning and disinfection of frequently touched or high touched surfaces (e.g. bedrails, bedside tables, commodes, doorknobs, sinks, surfaces and equipment) is important, especially those closest to the resident. Refer to chapter 7 '*Environmental and Facilities Management*' for more information.

3.9.6 Safe Handling of Equipment, Instruments and Devices

Equipment/instruments/devices used on residents can become contaminated via simple contact but also via blood, body fluids, secretions and excretions during the delivery of care. Medical equipment and instruments/devices must be cleaned and maintained according to the manufacturer's instructions to prevent resident-to-resident transmission of infectious agents.

Commodes, intravenous pumps and ventilators must be thoroughly cleaned and disinfected before use on another resident. All such equipment and devices should be handled in a manner that will prevent HCWs from contacting infectious material. It is also important to clean electronic devices (e.g. computers and mobile tablets) used in LTCFs.

3.9.7 Linen and Waste Management

Soiled linen and waste should be handled carefully to prevent cross contamination to HCWs and other residents. Waste should be bagged in impervious bags and segregated according to the national regulation (Refer to chapter 7 for more details). Soiled linen should be handled as little as possible. Gloves should be worn when handling linen soiled with blood or body fluids. Linen shall be bagged in an impervious bag and placed in the designated location in the facility or into the washing machine. Soluble bags are not necessary. Washing cycle temperature should reach 65°C for at least ten minutes, or 71°C for at least three minutes.

3.10 Contact Precautions

Contact Precautions are intended to prevent transmission of microorganisms which are spread by direct or indirect contact with the resident or their environment. Also refer to chapter 8 on Multi-Drug Resistant Organisms.

3.10.1 Resident placement

For the nursing home setting, where the facility is indeed the residents' home, the implementation of IPC precautions at a level required in an acute care setting may have

adverse psychological consequences for the resident. This should be taken into consideration when implementing contact precautions and isolation.

A single isolation room is preferred for residents who require contact precautions. If an isolation room is not available, residents infected with the same organism can be cohorted in the same multi-patient room. In such cases, a minimum of 1.5 metres spatial separation between beds is recommended.

3.10.2. PPE

Appropriate PPE should be worn when there is potential contact with residents or potentially contaminated areas in the resident's environment. Donning PPE upon room entry and discarding before leaving the resident room should help to contain pathogens that can be transmitted through environmental contamination.

Gloves

- a) Hand hygiene should be completed prior to donning gloves.
- b) Gloves should be worn while providing care for the resident.
- c) Gloves should be changed after contact with infective material (e.g. faecal material and wound drainage).
- d) Gloves should be removed after providing resident care and hand hygiene should be performed immediately.

Gowns

A disposable gown should be donned to provide resident care when there is likelihood of contamination. The disposable gown should be removed upon completing resident care or before leaving the room. After removal of the gown, clothing should not contact potentially contaminated environmental surfaces.

3.10.3. Resident Care Equipment

Dedicated equipment should be considered for residents requiring contact precautions. If sharing of equipment is unavoidable, the equipment should be adequately cleaned and disinfected before using on another resident.

3.10.4. Resident/Family Education

Resident/family education should include methods to minimize the risk of infection transmission.

3.11 Droplet Precautions

Droplets (larger than 5µm in size) are generated when an infected person coughs, sneezes or talks and during procedures (such as suctioning, administering nebulized medications and cough induction by chest physiotherapy).

Transmission occurs when droplets containing microorganisms generated from the infected person are propelled a short distance through the air (usually less than one metre) and deposited on the conjunctivae, nasal mucosa or mouth of a susceptible individual. Droplets do not remain suspended in the air, thus special air handling and ventilation are not required to prevent droplet transmission. Droplets can also contaminate the surrounding environment and lead to indirect contact transmission. The area of defined risk of 1.5 metre around the resident is based on epidemiologic and simulated studies of selected infections. This makes it different from airborne transmission. Using this distance for donning masks has been effective in preventing transmission of infectious agents via the droplet route.

Droplet precautions may be considered for the following conditions:

- a) Influenza
- b) pneumonia
- c) *Streptococcus* pharyngitis

3.11.1 Resident Placement

Single room is preferred for Droplet Precautions. However, if single room is not available, consult IPC personnel on other resident placement options (e.g. cohorting resident with same organisms in the same room). Recommended spatial separation of 1.5 metres is important for resident in multi-bed rooms with infections transmitted by droplet route.

3.11.2 PPE

HCW should observe droplet precautions by wearing a surgical or procedure mask with eye protection when within 1.5 metre of the resident, when examining a resident with symptoms of a respiratory infection, particularly if fever is present and the resident is actively coughing. A surgical mask should be worn when entering the area where the resident is located. When transporting such residents outside the room, the resident should wear a mask (if tolerated) and practice respiratory/cough etiquette.

These precautions should be maintained until it is determined that the cause of symptoms is not an infectious agent that requires droplet precautions.

3.11.3 Resident/Family Education

Resident/family education should include methods to minimize the risk of infection transmission.

3.12 Airborne Precautions

Airborne transmission can occur with a few infectious microorganisms that can travel on tiny respiratory particles called droplet nuclei (small particle residue of 5µm or smaller in size) containing them. Microorganisms carried in this manner remain suspended in the air for long periods of time and can be dispersed widely by air currents. A susceptible host within the same room or over a longer distance from the source resident may be infected by inhaling these airborne microorganisms. Environmental controls such as special air handling and ventilation may reduce airborne transmission.

Microorganisms transmitted by airborne transmission and relevant to LTCFs are *Mycobacterium tuberculosis*, Measles and Varicella (Chicken Pox, disseminated zoster or widespread shingles). Residents suspected of such conditions should be transferred to an acute hospital to allow isolation, investigation and treatment. HCWs who are immune to Varicella and measles are not required to put on PPE. A workflow is required to enable safe care of the resident while awaiting transfer to an acute setting.

3.12.1 Resident Placement

Airborne infection isolation precautions can prevent transmission of infectious agents that remain infectious over long distance when suspended in the air. The resident should preferably be transferred to an acute hospital negative pressure isolation room with special air handling and ventilation system. While awaiting transfer, a resident requiring airborne precautions should be placed in a well-ventilated single room (with open windows to the external environment without passing foot traffic, away from other patients).

3.12.2 PPE

A NIOSH-approved N95 mask should be worn at all times when entering the room of a resident with a known or suspected communicable disease transmitted by the airborne route. Gown and gloves are not required. Susceptible individuals should avoid entering the room of

a resident with measles, chicken pox or disseminated zoster. Preferably, only HCWs and caregivers who are immune to these diseases should provide care.

3.12.3 Resident/Family Education

Resident/family education should include methods to minimize the risk of infection transmission.

3.13 Discontinuation of Isolation/Cohorting

Contact, Droplet and airborne precautions shall remain in effect during the incubation and infectious period. A resident may be removed from isolation or cohorting when he is assessed to have passed the infectious period (Refer to Chapter 9 for incubation and infectious periods).

3.14 Recommendations

- a) Each LTCF should have a written policy describing how the guidelines in this chapter are to be met. The policy should authorise HCWs to initiate the appropriate transmission-based precautions at the onset of symptoms and permit discontinuation of transmission-based precautions in consultation with the IPC personnel.
- b) Standard Precautions should be part of the work culture of all LTCFs and the daily practice of each HCW during the care of all residents at all times.
- c) A risk assessment should be made by the HCW before each interaction with a resident or their environment in order to determine which precautions are required to prevent transmission during the planned interaction.
- d) A comprehensive hand hygiene programme should be established in all LTCFs.
- e) Education on the proper use of PPE should be provided to all LTCF staff and volunteers who have the potential to be exposed to blood and body fluids.
- f) Gloves are to be worn when it is anticipated that the hands will be in contact with mucous membranes, non-intact skin, tissue, blood, body fluids, secretions, excretions, or equipment and environmental surfaces contaminated with the above.
- g) Gloves are not required for routine healthcare activities in which contact is limited to the intact skin of the resident.
- h) Hand hygiene should be done before putting on gloves.
- i) Gowns are to be removed immediately after the task for which it has been used in a manner that prevents contamination of clothing or skin and prevents agitation of the gown.

- j) A mask and eye protection should be worn to protect the mucous membranes of the eyes, nose and mouth when it is anticipated that a procedure or care activity is likely to generate splashes or sprays of blood, body fluids, secretions or excretions.
- k) Residents who are unable to maintain hygiene should be placed in single rooms/ cohort areas with dedicated toileting facilities.
- l) A sharps injury prevention programme should be established in all LTCFs.
- m) All residents with diarrhoea should be treated as a suspected *Clostridium difficile* case.

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For Consultation

4.1 **Care of Urinary Catheters**

Urinary tract infections (UTIs) have been found to be the most common type of Healthcare-Associated Infection (HAIs) among LTCF residents. There are no published local epidemiology data from Singapore but small case studies have suggested that the majority of drug resistant gram-negative microorganisms have a urinary tract origin.

4.1.1 **Indication for Urinary Catheterisation**

Urinary catheterisation is a procedure performed by HCWs to:

- a) Empty the bladder.
- b) Counteract incontinence and maintain skin integrity when all conservative measures have failed (e.g. Assist the healing of an open sacral sore or perianal wound)
- c) Bypass an obstruction.
- d) Obtain a sterile urine specimen.

4.1.2 **Pathogenesis**

The presence of a urethral catheter will bypass or inhibit natural host defences, predisposing residents to catheter-associated UTIs (CAUTIs). This is further exacerbated by the development of biofilm on urinary catheters, which provides a favourable environment for bacterial proliferation and invasion.

Bacteria may be introduced into the urinary tract via several routes, such as:

- a) Inoculation at the time of catheter insertion, especially in residents who have had inadequate disinfection of the urethra opening prior to catheterisation.
- b) Intraluminal ascent in the urinary catheter after contamination of the urinary catheter and/or bag (such as via breaks in aseptic practice during the opening of urinary drainage bag taps, or disconnection of catheters from urinary bags).
- c) Extra-luminal route of ascent, along the external surface of the urinary catheter and the urethra. The risk of developing bacteriuria hence correlates with duration of catheterisation.

4.1.3 **Risk factors**

Risk factors for CAUTI are broadly divided into host factors, bacterial factors and catheter factors. Prospective observational studies which did multivariable analyses identified the major risk factors for CAUTI, which include:

- a) Duration of catheterization if aseptic technique is not maintained
- b) Female gender due to a shorter urethral
- c) Anatomical or functional abnormalities of the urinary tract
- d) Insertion of the catheter outside the operating theatre (sterility)
- e) Diabetes mellitus
- f) Poor catheterization technique or breaks in aseptic technique

4.1.4 Conducting a CAUTI Risk Assessment

CAUTI risk assessment should be performed to guide the development of a surveillance, prevention, and control plan that is based on facility-specific data and conditions. Baseline CAUTI Risk Assessment can be conducted to determine the demographics of those residents who have the highest utilisation of indwelling urinary catheters (See Appendix).

Surveillance data collected by IPC personnel for the CAUTI Risk Assessment will help to provide information needed to identify whether CAUTI is increasing, decreasing or remaining the same in the facility. The following steps may be used for conducting a CAUTI Risk Assessment:

- a) Step 1: Assess whether an effective organization programme exists
- b) Step 2: Assess population at risk
- c) Step 3: Assess baseline outcome data
- d) Step 4: Determine financial impact

Note: The CAUTI Risk Assessment may not be suitable for all facilities / services in the LTCF settings. It will be difficult to establish the accuracy and reliability of the CAUTI Risk Assessment in the Home Care setting as HCWs' time spent with the client is extremely limited and the frequency of the visits varies.

A point prevalence study may be used to provide baseline data to complete the risk assessment, monitor trend in care practices and identify outliers per unit, shift, or service. The denominator for this survey is the number of residents who have urinary catheters.

Once the CAUTI risk assessment baseline is established, CAUTI rates can be compared over time to determine if there are trends within resident populations and/or departments. Evaluation of the CAUTI risk assessment will influence plans for control of CAUTI in the facility e.g. it may be decided that the CAUTI surveillance, prevention and control plan will target symptomatic CAUTI (i.e. exclude asymptomatic bacteriuria).

4.1.5 Types of Catheters Used

Urinary catheters are recommended to be in situ for:

- a) Short-term catheter has a maximum duration of 4 weeks
- b) Long-term catheter can be in situ for up to 12 weeks duration

Silver-coated catheters have been suggested to reduce the incidence of bacteriuria, however, there is insufficient evidence on its effect on the reduction of CAUTI in short-term catheters. Silver-coated catheters are relatively more costly than a Foley's catheter.

Accurate catheter size and balloon should be determined to minimise factors that will increase the risk of CAUTI, including urethral trauma, mucosal irritation and retention of urine. HCWs should use as small a catheter as possible, which is consistent with proper drainage, to minimize urethral trauma.

Appropriate catheter sizes:

- a) Female: 10-12Fr
- b) Male: 12-14Fr
- c) Suprapubic: 16-18Fr

Appropriate lengths:

- a) Female Length 20-25cm.
- b) Standard Length (usable by both Male & Female): 41-45cm.

For Intermittent Self-Catheterisation (IMC): self-lubricating hydrophilic catheters are recommended. Residents and caregivers performing IMC should be trained by a HCW. If the resident requires a catheter that is out of the normal specifications due to pre-existing urological condition, he should consult a Urologist before performing IMC.

4.1.6 CAUTI Insertion Bundle

Verification of need prior to insertion

Potential complications of catheters include infection (CAUTI), bacteraemia, urethritis, urethral stricture, and haematuria and bladder perforation. The most important prevention measure is to limit the use of urinary catheters to genuine indications and for no longer than is needed. Prior to catheterization, consideration should be given to alternative management methods (e.g. intermittent catheterization), which may be temporary or permanent.

Assessment of the need for urinary catheters should be performed prior to insertion. Studies have shown that indwelling catheters are frequently used when not indicated or, if indicated, remain in situ longer than necessary. Various studies have demonstrated that the presence of the urinary catheter is inappropriate in 21 – 54% of catheterized residents.

Insert urinary catheter using aseptic technique

HCWs performing urethral catheterization should be trained and assessed as competent on the technical aspects and application of the principles of the aseptic technique to minimise the risk of infection.

Standard precautions must be applied by all HCWs when inserting and caring for urinary catheters with particular reference to hand hygiene, personal protective equipment (PPE) and management of waste. Hand hygiene must be performed immediately before donning sterile gloves prior to insertion of a urinary catheter and after removal of PPE.

Meatal cleaning and environmental disinfection

As infection can occur extra-luminally (via the external surface of the catheter) when the catheter is inserted, the urethral meatus should be carefully cleaned prior to catheterization.

Insertion procedure for indwelling urethral catheter

Urethral catheterization can cause bruising and trauma to the urethral mucosa which then acts as an entry point for microorganisms into the blood and lymphatic system.

It is recommended that an appropriate lubricant or anaesthetic gel from a single-use container should be applied to the urethral meatus and catheter surface (for the manufacturer's recommended duration), prior to the insertion of the catheter to minimize urethral trauma or infection.

Removal procedure for indwelling urethral catheter

Indwelling urinary catheter balloon must be deflated prior to removal. Note:

- a) Do not pull on the syringe but allow it to fill up on its own, so as to prevent a collapse of the inflation channel, thus making the deflation difficult; and
- b) Do not over-inflate the balloon to try to burst it nor cut the inflation arm but seek medical advice if concerned.

Intermittent Catheterization

- a) Aseptic technique - when undertaken by HCW.
- b) Clean technique - when undertaken by the resident or their caregiver.

4.1.7 Management of Resident on Urinary Catheter

Products required

The products required are:

- a) Single-use urine bags to be attached at night and removed in the morning. If the resident is bed-bound, the urine bag can be changed every seven days as per manufacturer's instructions or when it is half full with urine.
- b) Catheter stand for securing of urine bags

Emptying of the urine bag

Empty bags when half full, to avoid trauma due to the weight of the bag pulling on the catheter. Practice hand hygiene before and after and ensure gloves are worn. It is a "clean" procedure and the tip of the urine bag should be disinfected with an alcohol swab before and after drainage.

Changing of used bags

Change urine bag according to manufacturer's recommendation. Practise hand hygiene prior and after and ensure gloves are worn. Be mindful not to contaminate the tip of the bag and catheter port when reconnecting. Date of Change is to be written on the new urine bag in permanent ink. Old urine bag is to be emptied and discarded appropriately.

Keeping the catheter clean

- a) Wash and dry hands thoroughly.
- b) Clean around the urethral area (and under the foreskin in males) with warm water and dry thoroughly at least twice a day.
- c) Continue with regular bathing or showering regimen of the resident.
- d) If there is visible debris on the catheter, wipe down the catheter with a damp cloth, taking precaution not to pull on the tubing. Dry thoroughly after.
- e) Wash and dry hands thoroughly.
- f) The tip of the urine bag should NOT be touching the floor at any time.

Other factors to consider

- a) Urine dipstick should not be used to diagnose UTI in residents with catheters in situ.

- b) Urinalysis should only be sent to the laboratory if the resident has clinical symptoms and not because the urine differs in smell or appearance as other factors can cause this (e.g. poor fluid intake).
- c) If an indwelling catheter has been in place for more than two weeks at the onset of CAUTI, the catheter should be replaced immediately to hasten the resolution of symptoms. If urine sample is required, it should be obtained from the new catheter.
- d) Urine samples should be obtained aseptically from the sampling ports only.
- e) Maintaining a sterile, closed-drainage system is critical for prevention of CAUTI.
- f) When a catheter has been pulled out or expelled do not insert another catheter in the next 48 hours to allow for an assessment of the possible trauma caused. Re-catheterisation immediately after trauma can increase the incidence of CAUTI as bacteria has a direct access to the bloodstream due to bleeding caused by trauma. If bleeding is present, observe the colour and amount, inform the doctor if prolonged haematuria or undue pain is experienced by the resident.

For recommendations to educate catheterised residents on personal hygiene and fluid intake, refer to Appendix 4A. (page 48)

For recommendations on managing and advising residents receiving catheter care at home, refer to Appendix 4B. (page 49)

4.2 Care of Tracheostomies

This section provides information to those caring for residents in the community with temporary or permanent tracheostomies either regularly or occasionally, guiding HCWs on the essential caregiver training that is essential to minimise the risk of infection to caregivers, HCWs, community or immediate family.

As tracheostomy care has become a part of not just acute but long-term care, it is essential that HCWs are adequately equipped with the knowledge and skills to standards of practices are maintained to minimise nosocomial infections, prolonged hospitalisation due to complications or even death. HCWs are also an integral part of training to caregivers of residents in the community who are unable to manage on their own at home.

It is important to acknowledge that there will be differences between the practices and procedures involved in caring for a resident with a tracheostomy who lives in the community, where the stoma is established, to those who are in acute healthcare facilities.

4.2.1 Indications for a Tracheostomy

Indications for tracheostomy include:

- a) Chronic or elective setting - usually when the resident is to be ventilated for the longer term.
- b) Obstruction of the upper airway (e.g. trauma, infection, laryngeal tumour, facial fractures).
- c) Impaired respiratory function
- d) To help clear secretions in the upper airway

4.2.2 Types of Tracheostomy

Both fenestrated and un-fenestrated tracheostomies may or may not be cuffed. Fenestrated tracheostomies have a hole in the outer cannula which means that air can pass from the lungs and up to the vocal cords and also the mouth and nose, making speech easier for residents. Residents can thus breathe and speak better.

Double cannula tracheostomy has an inner and an outer tube. The inner tube reduces the lumen of the outer tube meaning that respiratory effort is increased but the outer tube means that the stoma stays open.

4.2.3 Tracheostomy Stoma Care and Hygiene

Key Points when providing tracheostomy care:

- a) Practice effective Hand Hygiene technique before and after procedure (see chapter 6).
- b) Don on surgical mask at all times, use a Face Shield if required.
- c) Ensure all requisites are prepared in advance.
- d) Maintain aseptic technique.
- e) Observe for signs and symptoms of infection.

4.2.4 Signs and Symptoms of Stoma Infection

The HCW should observe for:

- a) Excessive secretions
- b) Foul-smelling secretions

- c) Colour of secretions is yellow or green
- d) Erythema or erosion of stoma site
- e) Fever, malaise
- f) Loss of appetite

If infection is suspected, staff should:

- a) Obtain a sputum specimen for culture aseptically with a Sputum-trap if required; and
- b) Inform doctor-in-charge.

4.2.5 PPE

PPE normally comprises of gloves, apron, goggles and surgical mask in tracheostomy care. It is advisable to don a surgical face mask and goggles to protect the HCW providing the care.

In the home care setting, HCWs should be equipped with essential PPE to bring along on each visit. In the case where the resident and their caregivers could not afford PPE, they are encouraged to practice strict hand hygiene through training by our HCWs. Caregiver training is given to carry out tasks like tracheostomy suctioning to maintain sterility in the technique as much as possible. Residents or their caregivers should also be taught on how to identify signs and symptoms of infection and when to inform the Home Care team.

4.3 Recommendations

- a) Each LTCF should have a written policy describing how the guidelines in this chapter are to be met
- b) Urinary catheterisation should always be carried out under strict aseptic techniques.
- c) HCW should always adhere to Infection Prevention and Control Guidelines on Hand Hygiene and donning of PPE. Advice should be given to caregivers in the home care setting to follow suit.
- d) Good perineal and personal hygiene must be maintained for the resident.
- e) HCW must have good understanding and knowledge of their resident's behaviour and characteristics to detect a cause for concern.
- f) HCW should adhere to strict Infection prevention and control Guidelines in Hand Hygiene and Donning of PPE.
- g) HCW must ensure that caregivers are competent in the Home Care setting to care for a client with a tracheostomy and what to do in an emergency.

4.4 References

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4.5 Appendix 4A

Recommendations on educating catheterised residents on personal hygiene, fluid intake and urine assessment

Personal hygiene to help prevent infection

The following education should be provided to resident to promote good personal hygiene to prevent infection:

- a) Always wash hands before and after touching catheter.
- b) Male residents should take note to wash under the foreskin (unless circumcised) at least twice a day, dry it thoroughly and ensure it is pulled back over the end of the penis.
- c) Female residents should always wash the genital area from front to back to prevent contamination from the back passage and dry in the same sequence.
- d) Avoid the use of talc, bubble bath, antiseptic solutions etc, as these can cause irritation.

Advice on fluid intake

- a) Resident should drink at least two litres of fluid daily if there is no contraindication to this (e.g. heart conditions such as Congestive Cardiac Failure).
- b) Resident or caregiver should be advised to keep a record of fluid intake until a routine has been established.
- c) Minimise caffeine intake if resident has a sensitive bladder, caffeine also has a diuretic effect.
- d) Increase fluid intake if sediment is present in the urine or if urine appears concentrated.

Characteristics of urine

The nurse should discuss with the resident in more detail holistically pertaining to his / her condition.

- a) Urine should be a pale yellow colour.
- b) Do take note that some food or medication may discolour the urine.

4.6 Appendix 4B

Recommendations for managing residents receiving catheter care at home

Support from the Nurse

- a) Support with catheter care needs as required
- b) Initial phone contact to assess catheter needs of the resident
- c) Advice on products, care and maintenance of catheter
- d) Plan dates of catheter change
- e) Baseline assessments to be highly certain of CAUTI diagnosis before escalating it to a doctor or advising the resident to see a doctor

Educating residents on when to call for assistance

- a) Lower abdominal pain or bloating is experienced
- b) If the catheter falls out regardless if the resident is unable to pass urine or not
- c) Urine is not draining and self-help advice given by the Nurse has been followed
- d) If the urine is cloudy or bloody, smelly or burning sensation is felt at the urethral area, which is not relieved even after drinking extra fluids
- e) If frank blood is being passed (bright red blood)

5.1 Surveillance

Surveillance is essential for the monitoring of infectious diseases (IDs) and effective prevention and control of outbreaks. Each LTCF should define how clinical infections in residents are identified, reported and where appropriate, escalated (to whom and in what time frame).

Infection surveillance in the LTCFs involves the systematic collection, consolidation, and analysis of healthcare associated infections (HAIs) data. Standardization of surveillance is ideal with the following recommended steps:

- a) Assess the residential/nursing home population;
- b) Select the outcome or process for surveillance; examples of process measures include compliance in hand hygiene and correct catheter care technique;
- c) Use standardised surveillance definitions (e.g. Refer to *MOH Technical Manual for the Surveillance of National Infection Prevention and Control Indicators*);
- d) Collect surveillance data;
- e) Analyse healthcare associated infection data to detect trends and instigate specific interventions such as education and IPC programmes;
- f) Share results of surveillance with respective stakeholders for them to develop appropriate action plans, if required. Timely internal reporting of such results is recommended.

It is recommended that all LTCFs keep an ongoing baseline surveillance of their residents and staff for common infectious disease symptoms. This is done systematically by keeping records of residents and staff with such symptoms e.g.

- Respiratory symptoms – fever, cough, running nose, sore throat, etc., especially when cases have more than one symptom
- Food poisoning/Gastroenteritis – diarrhoea, vomiting, etc.
- Non-specific viral syndromes – in particular fever AND rashes without other symptoms
- Conjunctivitis (i.e. red eyes)
- Newly developed skin conditions with similar presentations – chickenpox, cellulitis, scabies

5.2. Definition of an Outbreak

An increase in the number of persons with infectious disease symptoms above the baseline will be an early indication of a possible infectious disease cluster or an outbreak.

5.3. Outbreak Investigation and Management

All outbreaks, however minor, should be investigated promptly and the outcomes documented. Control measures that may be implemented include:

- Isolating or moving affected residents to a designated part of the ward
- Temporary segregation from other residents; including activities, meals etc.
- Surgical mask wearing, strict hand hygiene for staff in contact with that resident
- Surgical mask wearing of the resident if movement or transport is necessary
- Dedicated toilet in the case of diarrhoeal outbreak
- Practising appropriate transmission based precautions (e.g. Influenza and respiratory tract infections require droplet precautions)
- Timely education on hand hygiene or care of devices as well as audits may be required
- Immunisation or prophylaxis, if needed and relevant may be used to help control spread of the outbreak
- Visiting arrangements by family members or friends should also be defined as part of control measures.

It is good practice to also notify the appropriate regional general hospital of the outbreak in order to facilitate transfers of residents requiring acute medical attention or treatment and also to restrict admission of residents to the LTCF facility during the duration of the outbreak.

5.4 Triggers for LTCFs to Notify ID Clusters to MOH

MOH should be informed of the outbreak, if any of the following criteria are met:

- 10% of the total population (residents and staff) within 14 days are affected with the same illness
- 10 cases within 3 consecutive days
- Case(s) are severely ill [Dangerously Ill List (DIL) or in Intensive Care Unit (ICU)] or died.

All clusters of IDs which have met MOH's reporting criteria should be notified to MOH **within 24 hours of detection** via email (reportidcluster@moh.gov.sg), using the MOH Email Notification Template ([Table 5.1](#)). For urgent notifications or requests for assistance,

LTCFs must contact the MOH at 9826 9294 directly, followed by formal notifications via email. Once notified, MOH will also assist the affected institution to monitor the situation, provide advice on additional infection prevention and control measures, and facilitate identification of pathogen(s) through laboratory testing, if necessary. Please refer to MOH *Guidelines on the notification of clusters of infectious diseases in Singapore* for details on notification of ID clusters.

Table 5.1: Email notification template for clusters of infectious diseases

S/N	Information required	Example
1.	Name of institution	ABC Nursing Home (COO Office)
2.	Address of Institution	111 May Road S(123456)
3.	Point of contact Contact number	Ms ABC (Manager) 61234567
4.	Number of cases as at date and time	13 as of 11 am, 11 Oct 2017
5.	Signs and symptoms	Abdominal pain, diarrhoea
6.	Onset date for the first case(s) Onset date for the last case(s)	8 Oct 2017 10 Oct 2017
7.	Current strength of residents and staff	122 residents 49 staff, including office and admin staff
8.	Number of cases hospitalised, if such info is available	3 at XXX Hospital

5.3 **Recommendation**

Each LTCF should have a written policy describing how the guidelines in this chapter are to be met.

5.4. **References**

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CHAPTER 6 HAND HYGIENE

Hand Hygiene is the most important and effective procedure to prevent and control the spread of hospital associated infections (HAIs).

6.1 **Methods of Hand Hygiene**

Effective hand hygiene kills or removes transient bacteria on the skin via any of the following two methods:

- a) Use of an alcohol-based hand rub (ABHR); and
- b) Hand washing with soap and running water

Use of an alcohol-based (isopropyl alcohol, ethanol, or n-propanol) hand rub (ABHR) is the preferred method for cleaning hands, unless hands are visibly soiled. Using easily-accessible ABHR in healthcare settings takes less time and has been shown to be more effective than traditional hand washing with antimicrobial soap when hands are not visibly soiled. It takes 20-30 seconds to perform a complete hand rub (Refer to figure 6.1).

The antimicrobial activity of alcohols results from their ability to denature proteins. Alcohol solutions containing 60–80% alcohol are most effective, with higher concentrations being less potent because proteins are not denatured easily in the absence of water. Despite its effectiveness against most organisms, alcohols have very poor activity against bacterial spores, protozoan oocysts, and certain non-enveloped (non-lipophilic) viruses.

As the effectiveness of alcohol is inhibited by the presence of organic material, hand washing with soap and running water must be performed when hands are visibly soiled. The mechanical action of washing, rinsing and drying is the most important contributor to the removal of transient bacteria that might be present. This method takes about 40-60 seconds (Refer to Figure 6.2). If hands are visibly soiled and running water is not available, use a moistened towelette to remove the visible soil, followed by ABHR.

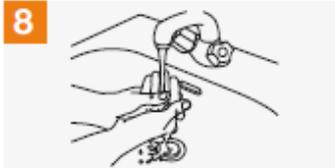
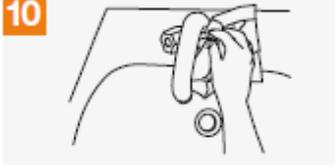
Figure 6.1: Hand hygiene technique with alcohol-based formulation



Figure 6.2: Hand hygiene technique with soap and water

Hand Hygiene Technique with Soap and Water

⌚ Duration of the entire procedure: 40-60 seconds

0  Wet hands with water;	1  Apply enough soap to cover all hand surfaces;	2  Rub hands palm to palm;
3  Right palm over left dorsum with interlaced fingers and vice versa;	4  Palm to palm with fingers interlaced;	5  Backs of fingers to opposing palms with fingers interlocked;
6  Rotational rubbing of left thumb clasped in right palm and vice versa;	7  Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;	8  Rinse hands with water;
9  Dry hands thoroughly with a single use towel;	10  Use towel to turn off faucet;	11  Your hands are now safe.

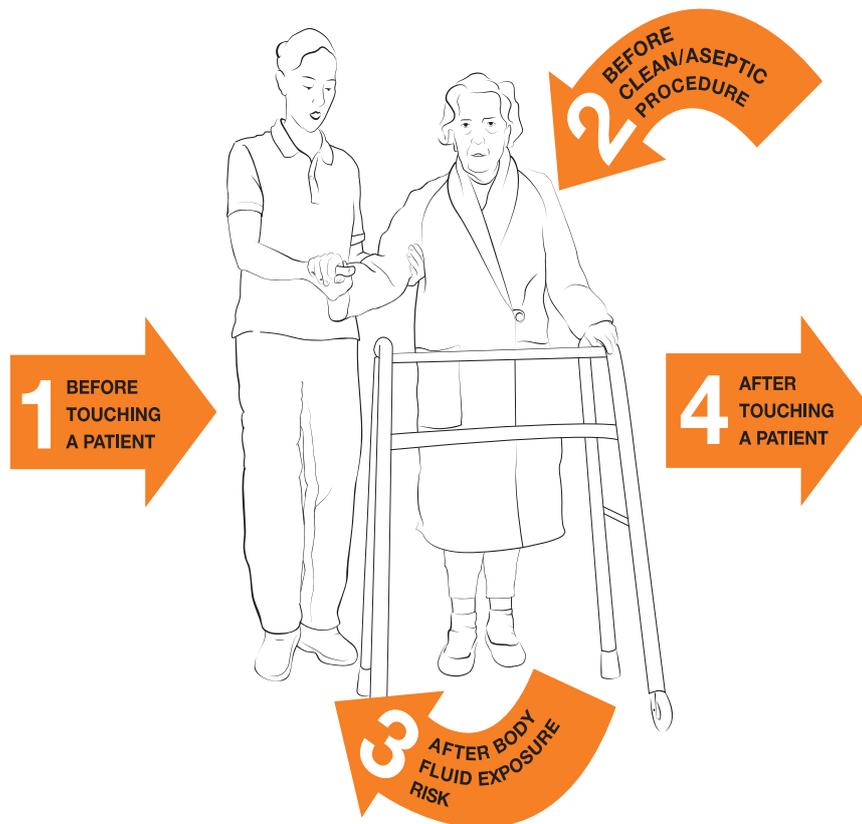
6.2 Indications for Hand Hygiene

“Your moments for Hand Hygiene” is designed by WHO to guide residential home Healthcare professionals (HCWs) on the fundamental moments for hand hygiene during care delivery (See [Figure 6.3](#)).

Figure 6.3: WHO “Your moments for Hand Hygiene in a residential home”

Your Moments for Hand Hygiene

Health care in a residential home



1	BEFORE TOUCHING A PATIENT	WHEN?	Clean your hands before touching a patient.
		WHY?	To protect the patient against harmful germs carried on your hands.
2	BEFORE CLEAN/ASEPTIC PROCEDURE	WHEN?	Clean your hands immediately before performing a clean/aseptic procedure.
		WHY?	To protect the patient against harmful germs, including the patient's own, from entering his/her body.
3	AFTER BODY FLUID EXPOSURE RISK	WHEN?	Clean your hands immediately after a procedure involving exposure risk to body fluids (and after glove removal).
		WHY?	To protect yourself and the environment from harmful patient germs.
4	AFTER TOUCHING A PATIENT	WHEN?	Clean your hands after touching the patient at the end of the encounter or when the encounter is interrupted.
		WHY?	To protect yourself and the environment from harmful patient germs.

Many of the activities in LTCFs are shared. Examples of opportunities for hand hygiene in LTCFs would include:

- a) Before beginning and after ending group activities (some residents may need help cleaning their hands before they begin and after they end an activity)

- b) Before assisting with meals or snacks
- c) After exposure of the hands to saliva or mucous membranes

6.3 Indications for Hand Hygiene for residents and visitors

Residents and visitors should be given teaching on indications for hand hygiene:

- a) Before meals or drinks
- b) Before touching eyes, nose, or mouth
- c) Before and after changing wound dressings or bandages
- d) After using the toilet or commode
- e) After blowing nose, coughing, or sneezing
- f) After touching hospital surfaces such as bed rails, bedside tables, doorknobs, remote controls, or the phone
- g) Before and after significant contact with other residents

Residents should be also encouraged to:

- a) Ask staff about hand hygiene practices
- b) Participate in hand hygiene
- c) Ask family and visitors to clean their hands when they visit them
- d) Ask sick family or visitors to refrain from visiting

6.4 Skin Reactions related to Alcohol Based Hand Rub

There are two predominant skin reactions associated with ABHR. The most common type is an irritant contact dermatitis with symptoms including dryness, irritation, itching, and extending to cracking and bleeding. Allergic contact dermatitis is rare and represents an allergy to some ingredient in the hand hygiene product. Symptoms of allergic contact dermatitis can range from mild and localized to severe and generalized.

There are three primary strategies for minimizing hand hygiene related irritant contact dermatitis among HCWs:

1. Selecting less irritating hand hygiene products;
2. Avoiding certain practices that increase the risk of skin irritation; and
3. Using compatible moisturizing skin care products following hand cleansing.
Hand creams should be chosen for their compatibility with the ABHR in use, as some hand creams inactivate the components in ABHRs.

6.5 Recommendations

- a) Each healthcare setting must have written hand hygiene policies and procedures.
To promote implementation of the guidelines in this chapter.
- b) A multidisciplinary, multifaceted hand hygiene programme must be developed and implemented in all LTCFs.
- c) Hand hygiene products are to be made available at point-of-care in all LTCFs.
- d) Provide staff with hand moisturizing skin-care products (and encourage regular frequent use) to counter any irritant contact dermatitis associated with ABHR.
- e) Wash hands with soap and water if there is visible soiling with dirt, blood, body fluids or other body substances.
- f) If hands are visibly soiled and running water is not available, use moistened towelettes, followed by ABHR.
- g) Before aseptic procedure, perform hand antisepsis using either an antimicrobial soap or an alcohol-based surgical hand rub before donning sterile gloves.
- h) Hand hygiene should be performed before donning and after removal of gloves.
- i) Educate HCWs on:
 - (i) indications for hand hygiene;
 - (ii) factors that influence hand hygiene;
 - (iii) hand hygiene agents;
 - (iv) hand hygiene techniques; and
 - (v) Hand care to promote skin integrity.
- j) Routinely monitor hand hygiene compliance with the provision of timely feedback by using a reliable, validated observer audit tool and training process.
- k) Monitoring should assess compliance with each of the WHO moments to direct education.
- l) Results of hand hygiene compliance should be regularly reviewed by the Infection prevention and control Committee.

6.6 References

- CDC. (2006). Management of Multidrug-Resistant Organisms in Healthcare Settings, 1-74.
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7.1 **Definitions**

Cleaning is defined as the physical removal of foreign material (e.g., dust, soil) and organic material (e.g., blood, secretions, excretions, microorganisms) from objects and surfaces. Cleaning physically removes rather than kills microorganisms. It is accomplished with water, detergents and mechanical action. Cleaning must be performed before disinfection or sterilisation.

Decontamination refers to the process of cleaning that removes pathogenic microorganisms from objects so that they are safe to handle, use, or discard.

Disinfectants are chemical agents that kill most disease-producing microorganisms, but not necessarily bacterial spores. Words with suffix “cide” (e.g. virucide, fungicide, bactericide, sporicide, and tuberculocide) can kill the type of microorganism identified by the prefix. For example, a bactericide is an agent that kills bacteria. Disinfectants are applied only to inanimate objects. Some products combine a “cleaner” with a disinfectant.

Disinfection refers to a process that kills most disease-producing microorganisms but not all bacterial spores. It is usually accomplished by the use of liquid chemicals or wet pasteurization in healthcare settings. Medical devices must be cleaned thoroughly before effective disinfection can take place. Success of this process is dependent on:

- a) Efficient prior cleaning
- b) Appropriate disinfectant for the micro-organisms present
- c) Appropriate strength of the disinfectant
- d) Compatibility of the equipment
- e) Appropriate contact time

Sterilisation refers to the validated process used to render a product free of all forms of viable microorganisms. In a sterilisation process, the presence of microorganisms on any individual item can be expressed in terms of probability. Although this probability can be reduced to a very low number, it can never be reduced to zero.

7.2 **Disinfection and Cleaning**

Routine cleaning and disinfection are necessary to maintain a standard of cleanliness, reduce microbial contamination and control or minimize the spread of infectious agents from

infected/colonised residents to other residents or healthcare workers (HCWs). Medical equipment also requires decontamination for safe resident care.

There are four categories of healthcare equipment (based on the method of cleaning and frequency of cleaning):

- a) Single use (disposable): Items that are designed for one-time usage on one resident e.g. sterile syringes, dressing sets & urinary catheters
- b) Single resident use: Items that are reusable on the same resident e.g. NG feeding syringe (syringe to be replaced twice a week)
- c) Reusable instruments: Instruments that can be decontaminated and reused
- d) Reusable equipment: Equipment that can be decontaminated and reused

7.2.1 Spaulding Classification

The Spaulding classification of medical devices is a clear and logical classification method that it has been retained, refined, and successfully used by HCWs for assessment of level of disinfection or sterilisation needed for medical devices (see [Table 7.1](#)). Examples of types of critical, semi critical and non-critical items and type of cleaning required are shown in [Table 7.2](#).

Table 7.1 Spaulding's Classification of Medical Devices and Required Level of Processing/Reprocessing

Classification	Definition	Level of Processing/ Reprocessing	Examples
Critical	Equipment/device that enters sterile tissues, including vascular system	Cleaning followed by sterilisation	Surgical instruments, biopsy instruments
Semi-critical	Equipment/device that comes into contact with non-intact skin or mucous membranes but do not penetrate them	Cleaning followed by high-level disinfection (as a minimum). Sterilisation is preferred	Respiratory therapy equipment, anesthesia equipment, Laryngoscope blade
Non-critical	Equipment/device that touches only intact skin and not mucous membranes, or does not directly touch the resident	Cleaning followed by low-level disinfection	ECG machines, pulse oximeter, bedpans, urinals, commodes, blood pressure cuffs, crutches, computers, bed rails, bedside tables, resident furniture and floors

Critical items

Critical items are objects that enter sterile tissue or the vascular system. These must be sterile because microbial contamination could result in disease transmission. This category includes surgical instruments, urinary catheters, injection needles, intravenous cannula. Most of the items can be purchased as sterile or be sterilised by steam sterilisation if possible. Heat sensitive object may be treated with hydrogen peroxide gas plasma, ozone, or by liquid chemical sterilants.

Some items which may come in contact with non-intact skin for a brief period of time (i.e., hydrotherapy tanks, bedside rails) are usually considered noncritical surfaces and are disinfected with low-or intermediate-level disinfectants (i.e. iodophor, alcohol, chlorine). Hydrotherapy tanks have been associated with spread of infection and some facilities have disinfected them with recommended levels of chlorine.

Semi critical items

Semi critical items are those that come in contact with mucous membranes or non-intact skin. Respiratory therapies, laryngoscope blades, diaphragm fitting rings are included in this category. These medical devices should be free of all microorganisms, although small numbers of bacterial spores may be present. Intact mucous membranes, such as those of the lungs or the gastrointestinal tract, generally are resistant to infection by common bacterial

spores but susceptible to other organisms such as bacteria, mycobacteria and viruses. When a disinfectant is selected for use with certain resident–care items, the chemical compatibility after extended use with the items to be disinfected must be considered.

Non-critical items

They are items that come in contact with intact skin but not mucous membranes. Intact skin acts as an effective barrier to most microorganisms; therefore the sterility of items coming in contact with intact skin is “not critical.” Examples of non-critical items are bedpans, blood pressure cuffs, crutches, bed rails, bedside tables, resident furniture, and floors.

Most non-critical reusable items may be decontaminated where they are used and do not need to be transported to central processing area. Mops (microfiber and cotton string), reusable cleaning cloths, and disposable wipes are regularly used to achieve low-level disinfection. Microfiber mops have demonstrated superior microbial removal compared to cotton string mops when used with detergent cleaner (95% versus 68%, respectively). However, use of a disinfectant did significant improve removal when a cotton string mop was used (95% versus 95%, respectively). It is important to change the water-disinfectant regularly. It is recommended to launder cotton string mops daily.

Table 7.2 Examples of types of critical, semi critical and non-critical items and type of cleaning required

Device Description	Examples	Usage of Device	Level of Processing/ Reprocessing
Critical Device i.e. Devices that enters sterile tissues, including the vascular system	Urinary Catheter	Single use	Discard after single use
	Syringes and needles for injection		
Semi-critical Device i.e. Device that comes in contact with non-intact skin or mucous membranes but do not penetrate them	Respiratory therapy equipment	Reusable	Cleaning followed by high level disinfection (sterilisation preferred)
	Oral Care instruments	Reusable/ single use	Cleaning followed by sterilisation or Discard after single use
	Dressing sets	Single use	Discard after single use
	Suction catheters		
Noncritical Device i.e. Device that touches only intact skin and not	ECG machines	Reusable	Cleaning followed by low level disinfection
	BP cuffs and pulse Oximetry		Disinfection / decontamination

mucous membranes, or does not directly touch the resident	Bedpans/ urinals,		Disinfection / decontamination (bedpan steriliser)
	Commodes		Disinfection / decontamination
	Bed		
	Walking frame/stick		
	Bedside tables		

7.2.2 Disinfection of Healthcare Equipment

A great number of disinfectants are used alone or in combination (e.g. hydrogen peroxide and peracetic acid) in the healthcare setting. These include alcohols, chlorine and chlorine compounds, glutaraldehyde, ortho-phthalaldehyde, hydrogen peroxide, iodophors, peracetic acid, and quaternary ammonium compounds (QUATs). In most instances, a given product is selected for the intended use and applied in an efficient manner. Caution must be exercised when using on electronic medical equipment.

7.2.3 Detergents and Cleaning Agents

“Detergents” or “soaps” are cleaning agents that make no antimicrobial claims. Their cleaning activity can be attributed to their detergent properties, which result in removal of dirt, soil and various organic substances. However, the use of a detergent solution improves the quality of cleaning.

7.2.4 Choosing a Disinfectant

IPC personnel should be involved in choosing disinfectants. Environmental surfaces usually only require cleansing followed by low to intermediate level disinfection. The following factors influence the choice of disinfectant:

- a) The nature of item to be disinfected
- b) The innate resistance of expected microorganisms to inactivating effects of the disinfectant
- c) The amount of organic soil present
- d) The type of and concentration of disinfectant used
- e) Duration of contact time required for efficacy at usual room temperature
- f) Compatibility with medical equipment
- g) Occupation health considerations

Surface disinfectants contain QUATs, hydrogen peroxide or sodium hypochlorite, which can cause skin and respiratory irritation. Products that are non-toxic and not irritating are

preferred. LTCFs should consider products that are biodegradable and safe for the environment. Many disinfectants (e.g. QUATs) may be hazardous both during manufacture and when they are discharged into the waste stream, as they are not readily biodegradable.

Recommended disinfectants for environmental use in healthcare setting include:

- a) Chlorine: Sodium hypochlorite (bleach)
- b) QUATs
- c) Iodophors
- d) Hydrogen Peroxide (AHP)
- e) Ethyl alcohol or isopropyl alcohol in concentrations of (60% -90%) used to disinfect small surfaces.

7.2.5 Using Disinfectants

When using a disinfectant, it is important that an item or surface be free from visible soil and other organic items before applying disinfectant. Their presence may reduce or eliminate the effectiveness of disinfectants. Use the disinfectant according to manufacturer's instructions on dilution and contact time.

Table 7.3 Types of Chemical Disinfectants

Disinfectants	Recommended Use	Precautions
Alcohol E.g. Isopropyl, Ethyl alcohol, methylated spirit.	Rapidly bactericidal, tuberculocidal, fungicidal and virucidal but do not destroy bacterial spores. Smooth metal surfaces, table tops and other surface on which bleach cannot be used. Effectively to disinfect non-critical items such as oral and rectal thermometers, hospital mobiles, BP cuffs and stethoscopes etc.	Flammable, toxic, to be used in cool and well- ventilated area, avoid inhalation. Observe fire code restrictions for storage of alcohol To be kept away from heat sources, electrical equipment, flames and hot surfaces.
Quaternary Ammonium Compounds (QUATs) e.g. Alkyl dimethyl benzyl ammonium chloride, Alkyl dimethyl ethylbenzyl ammonium chloride	Commonly used in general environmental cleaning of noncritical surfaces, such as floors, furniture, and walls	Relatively non-toxic and less corrosive Dilutions in use may get contaminated and grow Gram negative bacteria DO NOT use QUATs to disinfect instruments
Chlorine /Sodium hypochlorite [e.g. Sodium dichloroisocyanurate (NaDCC)]	Kills fast and has broad Spectrum actions against a wide range of Gram negative and Gram positive bacteria and spores.	PPE are required while handling and using undiluted Corrosiveness to metals

Disinfectants	Recommended Use	Precautions
	Environmental surfaces Noncritical equipment Blood spills	Flammable, toxic, to be used in cool and well-ventilated area, avoid inhalation. Low cost Rapid action Readily available
Hydrogen Peroxide Enhanced Action Formulation 0.5% (7% solution diluted 1:16)	Isolation room surfaces Clinic and procedure room surfaces Low-level disinfection is achieved after 5 minutes of contact at 20°C or according to manufacturer instruction	Safe for environment Non-toxic Rapid action Available in a wipe Active in the presence of organic materials Excellent cleaning ability due to detergent properties
Hydrogen peroxide 3%	Noncritical equipment used for home healthcare Floors, walls, furnishings Disinfection is achieved with a 3% solution after 10 minutes of contact.	Low cost Rapid action Safe for the environment Store in cool place, protect from light

7.2.7 Pasteurization (Thermal Disinfection)

Thermal disinfection is a process of hot water disinfection (75°C for 30 minutes), which is accomplished through the use of automated pasteurizers or washer disinfectors with a validated thermal disinfection cycle. The exposure time and temperature will vary with the type of the thermal disinfection process. Semi-critical medical devices suitable for thermal disinfection include equipment for respiratory therapy. Equipment/devices require thorough cleaning and rinsing prior to pasteurization.

7.2.8 Sterilisation

Most LTCFs do not sterilise instruments. Sterilisation is the elimination of all disease-producing microorganisms, including spores (e.g. *Clostridium* and *Bacillus* species) and prions. The latter are not susceptible to routine sterilisation. Sterilisation is used on critical medical equipment/devices and various semi-critical medical equipment/devices.

Medical equipment/devices that have contact with sterile body tissues or fluids are considered critical equipment/devices. They must be sterilised because microbial contamination could result in disease transmission. Whenever possible, semi-critical equipment/devices should be sterilised. When sterilisation is not possible, semi-critical equipment/devices shall be cleaned followed by high-level disinfection. The settings need to have written policies and procedures for sterilisation of medical equipment/devices processes.

Floors and walls should be constructed of materials capable of withstanding chemical agents used for cleaning and disinfecting. Ceilings and wall surfaces should be constructed with non-shedding materials. Physical arrangements of processing areas are presented schematically in four references.

Obtain input from a professional with infection prevention and control expertise before purchasing a new steriliser. Good communication is required between LTCFs and the manufacturer of the steriliser to ensure:

- a) Manufacturers provide specific, written instruction on installation and use of equipment
- b) Storage and transportation practices maintain sterility to the point of use
- c) Manufacturers are specific as to which medical equipment/devices can be sterilised in their machines and the recommended sterilisation methods.

They must be installed according to the manufacturer's instructions and be commissioned and maintained appropriately in compliance with the manufacturer's instructions.

Equipment Use and Preventive Maintenance

Table-top sterilisers undergo frequent use, wear and tear. The manufacturer's recommendations should be consulted for guidance on a preventive maintenance programme including regular inspection of gaskets and seals.

Sterilisation processes may be mechanical, chemical or biological. Monitoring should be done when a steriliser is first installed, before use and in routine performance assessments. The daily operation of every steriliser must be reviewed and documented. A logbook should be kept for this purpose. Any malfunction must be noted and appropriate action taken.

Physical monitors

A physical monitor is a device that monitors the physical parameters of a steriliser such as time, temperature and pressure that are measured during the sterilisation cycle and recorded on completion of each cycle.

Biological monitors

Biological indicators (BIs) are the most accepted means for monitoring of sterilisation, because they directly assess the procedure's effectiveness in killing micro-organisms. Spores

used are more resistant and present in greater numbers than common microbial contaminants found on resident care items. Therefore, an inactivated BI signifies that other potential pathogens in the load have been killed.

Conduct BI at least weekly. Follow the manufacturer's directions concerning the appropriate placement of the BI in the steriliser.

For Consultation

Chemical Indicators (CI)

A chemical indicator (CI) is a system that responds to a change in one or more predefined process variables with a chemical or physical change. There are six classes of chemical indicators (refer [Table 7.4](#), 'International types of Steam Chemical Indicators')

Table 7.4: International types of Steam Chemical Indicators

Type	Definition type	Use	Examples
I	Process indicator to differentiate processed from non-processed items	To indicate that item has been directly exposed to sterilisation process, usually applied outside of packages.	Indicator tapes indicator labels
II	Indicator for use in specific tests	To evaluate steriliser performance	Bowie-Dick test
III	Single variable indicator to indicate when a stated value has been reached e.g. temperature at specific location in chamber	For pack control monitoring but not as useful as Class IV or V indicators; for exposure control monitoring	Temperature tubes
IV	Multi-variable indicator that reacts to 2 or more critical variables in sterilisation cycle	For pack control	Paper strips
V	Integrating indicator that reacts to all critical variables in the sterilisation process (time, temperature, presence of steam) and has stated values that correlate to a BI at 3 time/temperature relationships	For pack control or as additional monitoring tool to release loads that do not contain implants	
VI	Emulating indicator that reacts to all critical variables (time, temperature, presence of steam) for specified sterilisation cycle (e.g. 10 min, 18 min, 40 min)	As internal pack control	

Storage

Sterile and single-use disposable items should be stored in an enclosed space, such as closed or covered cabinets that allow the packaged item to remain sterile. The storage area should be dedicated for storage only and be free of clutter and wiped clean at regular intervals. They should be stored above floor level away from direct sunlight and water in a secure dry and cool environment. They should not be stored under sinks or in other locations where they might become wet and contaminated.

Storage practices for packaged sterilised instruments may be either date or event-related. Dating assists in the recall of instruments should concerns arise with the results of sterilisation tests. Some health care facilities date every sterilised package and use shelf-life

practices (e.g. “first in, first out”). Others use event-related practices. The latter approach recognises that the packaged instruments should remain sterile indefinitely, unless an event causes them to become contaminated (e.g. torn or wet packaging).

Packages containing sterile instruments should be inspected before use to verify barrier integrity and dryness. If packaging is compromised, the instruments should be cleaned, packaged and sterilised again.

Monitoring and System Failures

Improper reprocessing includes, but is not limited to, the following situations:

- a) The load contains a positive BI;
- b) An incorrect reprocessing method was used on the equipment/device
- c) Reprocessing equipment indicators fail to reach correct parameters (e.g. temperature, pressure, exposure time);
- d) CI or monitoring tape has not changed colour
- e) There is doubt about the sterility of medical equipment /devices

A written procedure must be established for the recall and reprocessing of improperly reprocessed medical equipment/devices. All equipment/devices in each processed load must be recorded to enable tracking in the event of a recall. The recall procedure should include:

- a) Designation of department and staff responsible for executing the recall
- b) Identification of the medical equipment/devices to be recalled; if recall is due to a failed BI, the recall shall include the medical devices in the failed load as well as all other devices processed in the steriliser since the last successfully sterilised load
- c) Assessment of resident risk
- d) Procedure for subsequent notification of designated staff, residents

7.2.9 Recommendations

- a) LTCFs should have policies and procedures addressing infection prevention and control for environmental services, reprocessing of medical equipment, and facility design and construction.
- b) The chemical disinfectant used for disinfecting medical equipment/devices must be compatible with both the equipment/device manufacturer’s instruction for disinfection and the cleaning products involved in the reprocessing of the equipment/device.

- c) Reusable medical equipment/devices shall be thoroughly cleaned before disinfection or sterilisation.
- d) Home healthcare agencies may consider re-using single-use semi-critical medical equipment/devices for a single client in their home when reuse is safe and the cost of replacing the equipment/device is prohibitive for the client.
- e) All sterilisers must be tested for performance using physical, chemical and biological monitors and indicators. Chemical indicators do not replace the need to use a biological indicator.
- f) The daily operation of every steriliser must be reviewed and documented. A logbook should be kept for this purpose. Any malfunction must be noted and appropriate action taken.

7.3 Management of Blood and Body Fluid

Blood spills and other body fluids (e.g., urine, faeces or vomitus) should be contained, cleaned and disinfected as soon as possible (see Section 7.5.8: Handling and disposing of infectious waste). The aim is to prevent the transmission of infectious diseases and protect staff from exposure to infectious agents. As per basic principles, cleaning occurs prior to disinfection since organic material will inactivate disinfectants. Individual LTCFs should have protocols for blood and body fluids spills. Information that can be included and is not limited to are as follows:

- a) The expectation for timely response
- b) Clear appointment of staff responsible for cleaning spills during and after work hours
- c) A written procedure and staff training on how to clean a spill (including the types of equipment and chemicals/solutions to use) and the disposal of contaminated materials. (see table 7.5)
- d) Access to supplies (e.g. cleaning solutions and/or disinfectants) and PPE required for cleaning the spill

Table 7.5: Sample guide on cleaning procedure on Blood and body fluid spills

1. Assemble the materials/spill kit required for dealing with the spill prior to putting on PPE
2. Thorough inspection on the area around the spills for splatters or splashes
3. Restrict activity around the spill until the affected surroundings have been cleaned, disinfected and allowed to dry
4. Don PPE appropriately
5. Wipe up the blood or body fluids spill immediately with disposable towels. Dispose of the materials into regular waste receptacle, unless the soiled materials are so soaked that blood can be squeezed out of them, and they must be segregated into biohazard waste (i.e. yellow bag).
6. Disinfect the entire spill area used by the individual LTCFs or as recommended.
7. Wipe up the area again using disposable towels and discard the materials into regular waste.
8. Care to be taken to avoid unnecessary splashing during the clean-up.
9. Remove PPE and perform hand hygiene.

7.4 Environmental Hygiene

All surfaces in health care settings have the potential to harbour pathogenic microorganisms. It is essential to maintain a routine and consistent basis of cleanliness and environmental hygiene in healthcare settings including LTCFs. Routine housekeeping can reduce or control the spread of infectious agents.

7.4.1 Routine Cleaning

Routine cleaning and disinfection regimens are based on:

- a) Whether surfaces are high-touch or low-touch
- b) Type of activity taking place in the area and the risk of infection associated with it (e.g. isolation room vs meeting room)
- c) Vulnerability of residents housed in the area
- d) Risk of contamination of body fluid contamination of surfaces in the area

7.4.2 Contact with Surfaces

The potential for exposure to pathogens is based on the frequency of contact with a contaminated surface and the type of activity involved. For example, a conference room table would have less potential for exposure to pathogens than the doorknob in a resident's room. High-touch surfaces will require more frequent cleaning and this provides more effective disinfection.

High-touch Surfaces

High-touch surfaces require more frequent cleaning and disinfection than minimal contact surfaces. E.g. nurse's station, doorknobs, call bells, bedrails, light switches, computer keyboards, and medication cart. Cleaning and disinfection is usually done at least daily and more frequently if the risk of environmental contamination is higher.

Low-touch Surfaces

Low-touch surfaces are those that have minimal contact with hands. Examples include floors, walls, wall clock, ceilings, mirrors and windowsills. Low-touch surfaces require cleaning on a regular (but not necessarily daily) basis. However, prompt and appropriate cleaning is required when surfaces are visibly soiled, and when resident is discharged from the healthcare setting. Follow manufacturer's recommendations for equipment cleaning.

High-Touch Surfaces for Disinfection

- a) Tray table
- b) Beside table
- c) Door Knobs/Handles
- d) Door Surface
- e) Bed Rails
- f) Call Bell
- g) Phone
- h) Light Switches
- i) Resident Chair
- j) All Other Horizontal Surfaces
- k) Bedside Commode / Toilet Seat
- l) Medical Equipment

Room Cleaning Checklist

- a) At start, perform Hand Hygiene
- b) Don Personal Protective Equipment if required
- c) Disinfect High-Touch Surfaces
- d) Disinfect Bathroom:
 - (i) Toilet Door /Door Knob
 - (ii) Toilet Seat/handle
 - (iii) Bathroom Handrails

- (iv) Sink/Faucet
- (v) Tub/Shower
- (vi) Mirror
- e) Damp Dust:
 - (i) Overhead Light (if bed is empty)
 - (ii) TV & Stand
 - (iii) Clean Floor
 - (iv) Wall clock
 - (v) Mounted wall fans / ceiling fans
- f) Replace as needed:
 - (i) Hand sanitizer/chlorhexidine
 - (ii) Paper towels
 - (iii) Soiled curtains
- g) For terminal cleaning:
 - (i) Disinfect bed frame/mattress
 - (ii) Remake bed with clean linen
 - (iii) Replace as needed: pillows, mattresses, pillow covers, mattress covers
- h) Other:
 - (i) Empty trash and replace liner
 - (ii) Discard dust cloths
 - (iii) Change mop heads/disinfect after cleaning each isolation room (have different colour code mop for different areas of disinfection, e.g. kitchen, toilet, general cleaning, isolation room)

7.4.3 Vulnerability of the Resident Population

Frequent cleaning is highly recommended for vulnerable populations.

7.4.4 Factors that will impact on environmental cleaning

The probability that a surface, piece of equipment or care area will be contaminated is based on the activity in the area, the type of pathogens involved and the microbial load. Areas that are heavily soiled with blood or other body fluids will require more frequent cleaning and disinfection than areas that are minimally soiled or not soiled, (e.g. lounges, offices). The frequency of cleaning can be determined according to the level of contamination: heavy, moderate or light contamination (see example in [Table 7.6](#)).

Table 7.6: Risk Stratification Matrix to determine the frequency of cleaning: An example

Areas / Items	Probability of contamination	Potential for Exposure	Population	Total score
	Light :1	High-touch : 3	Less susceptible: 0	
	Moderate: 2	Low -touch:1	More susceptible: 1	
	Heavy: 3			
Isolation room	3	3	1	7
Bed rails	3	3	1	7
Bedside table	3	3	0	6
Call bell	2	3	1	6
phone	2	3	0	5
Light switch	2	3	0	5
Television stand	1	1	0	2
Toilet	3	3	1	7
Toilet Door / Knob	3	3	1	7
Toilet seat/bathroom rails	3	3	1	7
Toilet mirror	2	1	0	3

Interpretation of total score:

- **7 (High risk)** - clean after each case/event/procedure and at least twice per day, clean additionally as required;
- **4–6 (Moderate Risk)** - clean at least once daily, clean additionally as required (e.g. Gross soiling);
- **2–3 (Low risk)** - clean according to a fixed scheduled, clean additionally as required (e.g. Gross soiling)

7.4.5 Colour Coding for Cleaning

Adopting a colour coding of the cleaning of the environment and cleaning equipment is based on best practise. All cleaning items, for example, cloths (re-usable and disposable), mops, buckets, aprons and gloves, should be colour coded to reflect the different areas within the establishment. Periodically, change the cleaning items when necessary as they become less effective in cleaning.

7.4.6 Evaluation of Cleaning

Cleaning is a vital component of an intervention package required to reduce community-acquired infection. However, insufficient cleaning, or the mistiming of a cleaning intervention, increases risk.

Regular cleaning inspections and auditing of surfaces with the use of fluorescent markers or kits for measuring organic soil will motivate staff to clean more thoroughly. Education, monitoring and feedback have been also shown to enhance performance by housekeepers.

7.4.7 Recommendations

- a) LTCFs should have policies and procedures to address infection prevention and control processes for environmental services.
- b) There must be adequate numbers of staff trained to provide a clean and safe environment, including extra environmental cleaning capacity during outbreaks.
- c) Cleaning practises in LTCFs must be monitored and results reported back appropriately to become a part of the employee's performance review.
- d) Constantly encourage staff frequency of cleaning high infection risk surface tops.
- e) Evaluation of cleaning includes regular inspection and auditing.
- f) LTCFs should select appropriate detergents for environmental cleaning to reduce infection transmission risk.
- g) Environmental cleaning agents should be safe for residents, and as much as possible be environmentally friendly.

7.5 Waste management

Proper waste management in healthcare settings is vital in the prevention of potential healthcare associated infections.

7.5.1 Classification of waste

Healthcare waste includes all the waste generated in healthcare settings including infectious, chemical expired pharmaceuticals and sharps. All healthcare waste is regarded as hazardous and is required to be disposed of by licensed hospital waste contractors.

Biohazard waste

Biohazard waste includes:

- a) Infectious waste
- b) Pathological waste
- c) Potentially infectious sharps

General waste

General waste refers to waste that does not pose a hazard during handling and this includes:

- a) Office administrative waste
- b) Food waste
- c) Packing material
- d) Waste water from laundries and floor washing
- e) Dangerous substances and toxic industrial waste that have been treated and rendered harmless and safe for disposal
- f) Consumables used on residents that are not heavily soaked in blood e.g. diapers, dressing set, gauze, cotton swabs, PPE used

Cytotoxic waste

Cytotoxic waste refers to waste that has the capability to alter genetic material including:

- a) Expired or unused cytotoxic drugs
- b) Waste material contaminated with cytotoxic drugs eg sachets
- c) Body fluid of residents during chemotherapy

Infectious waste

Infectious waste refers to a type of biohazard waste that is capable of causing disease.

Examples include:

- a) Sharps contaminated with blood
- b) Waste capable of transmitting diseases from residents with infectious disease e.g. norovirus, influenza
- c) Dressings or other waste dripping with blood or caked with blood
- d) Faeces from residents with infectious diarrhoea

Pharmaceutical waste

Pharmaceutical waste refers to waste generated from pharmaceutical products and drugs that are expired or contaminated or are no longer required by the establishment.

7.5.2 Waste Management Plan

Management of healthcare waste in the Nursing Home requires a multidisciplinary approach. Each setting shall identify and establish proper procedures, describe the processes to eliminate or reduce hazard and risks associated with the disposal of waste.

Staff activities must be managed to reduce the risk of injuries and negative impact to the environment. Each healthcare setting shall clearly define the roles and responsibilities of every HCW in implementing these in policies and procedures.

The Waste Management Plan shall include:

- a) Waste disposal holding area(s)
- b) Frequency of waste collection from each location
- c) Duties and responsibilities for each of the different categories of staff who will generate healthcare waste and be involved in the management of the waste
- d) Procedures for the management of waste requiring special handling before final disposal
- e) Contingency plan for storage and disposal of hazardous waste in the event of disease outbreak or breakdown of collection arrangements
- f) Training courses and programmes
- g) Emergency procedures

The Waste Management Plan shall be regularly monitored, reviewed, revised and updated when necessary.

7.5.3 Waste Labelling

LTCFs must use the colour-coded disposal bags to segregate waste that need special handling and disposal:

- a) Yellow bags: biohazardous wastes
- b) Black bags: general wastes
- c) Purple bags: cytotoxic wastes (if applicable)

7.5.4 Storage and Frequency of Collection

Waste, in bags or containers should be stored in a separate area or building of a size appropriate to the quantities of waste produced and the frequency of collection.

The collection period should be scheduled, regular and ensure that odours from the waste does not cause nuisance. Waste receptacles may need to be stored before being transported to disposal sites. It should not be allowed to accumulate at corridors or other places accessible to unauthorized personnel or members of the public.

Waste from each ward level / department must be routinely transported to a storage collection area by the designated waste contractor of the respective LTCFs. Waste should be stored securely so as to prevent the escape, harm to the environment and harm to human health.

7.5.5 Containers for Disposal of Wastes

Plastic bags used for the collection and storage of clinical waste must be strong and durable enough to ensure containment. They should not be filled to more than 2/3 of their capacity in order to allow buffer for tying. Metal devices to secure closure are not allowed.

Sharps must be placed in sharps disposal containers that are rigid. The containers should not be emptied or cleaned and must not be more than 2/3 full to minimise the risk of sharps injuries. It should be locked (closed tightly) before being sent to the disposal holding area.

Other rigid walled containers if being used should be resistant to leakage, impact rupture, corrosion and must be washable. It must be cleaned regularly and whenever the internal area has been accidentally contaminated by unsealed clinical waste.

7.5.6 Transport

All facilities should optimize the waste collection process to reduce handling and transportation. Waste should be segregated into different categories based on potential hazard and disposal route. Waste should be transported according to its category i.e. General Waste or Infectious Waste. Staff transporting the waste must be informed of potentially infectious waste and possible health and safety hazards. They must be trained in the appropriate handling and disposal methods and informed of the fixed planned route to the central storage area. Transportation routes should avoid food preparation and areas with heavy traffic. Staff transporting waste must wear appropriate PPE to minimize exposure risk.

7.5.7 Bulk storage (waste holding area)

Bulk storage areas may be situated within the healthcare premise or at a licensed or permitted transfer / disposal facility. Bulk storage should be:

- a) Reserved for healthcare waste
- b) Ventilated and Well-lit
- c) Sited away from food preparation and general storage areas and routes used by the public

- d) Enclosed and secured to prevent unauthorized access
- e) Sited on a well-drained impervious hard standing
- f) Readily accessible but only to authorized people
- g) Kept locked when not in use
- h) Secured from entry by animals and free from insect or rodent infestations
- i) Provided with wash-down facilities
- j) Provided with separate clearly labelled areas for waste that require different treatment / disposal options
- k) Provided with access to first-aid facilities including hand washing facilities
- l) Drained appropriately to a sewer
- m) Cleaned regularly

7.5.8 Handling and Disposing of Infectious Waste

Appropriate handling and disposal of potentially infectious waste is important in preventing or minimising the spread of infection, illness and disease. When cleaning and disposing of potentially infectious waste such as blood or body fluids, or items blood-stained, the following steps should be taken:

- a) Wear disposable gloves, a plastic apron and face shield if anticipating possible splashes;
- b) Display caution signs to prevent traffic from stepping on to spills.
- c) Absorb the bulk of the spill with disposable materials such as paper towels or torn linen. Clear soaked material using tongs and deposit into biohazard bag;
- d) Clean the spill with water and appropriate disinfectant;
- e) After cleaning, disinfect the area with a freshly prepared solution of 10,000 ppm sodium hypochlorite and leave to dry. For small spills (e.g. spots of blood) use an alcohol wipe to clean and dispose the soiled wipe as general waste;
- f) Clean cleaning equipment such as mops and buckets with warm water and detergent and air dry;
- g) Remove and dispose used gloves and other waste such as paper towels into a sealable plastic bag;
- h) Wash hands thoroughly with soap and water;
- i) If the spill is on carpet, clean with a neutral detergent and arrange for the carpet to be cleaned with an industrial cleaner as soon as possible;
- j) Granular formulations that produce high available chlorine concentrations can be used to contain the spill and prevent airborne contaminants. Cleaning supervisors may assist in recommending products that are available from chemical supplier;

- k) Sharps should be disposed of immediately after use into sharps disposal boxes. No attempt should be made to recap, break or bend the needle as this is a common cause of injury; and
- l) If a needle-stick or other injury involving exposure to blood or body fluids occurs during handling and disposal of potentially infectious waste, the person should be medically assessed as soon as possible.

7.5.9 Recycling

All healthcare organisations are encouraged to adopt Reduce, Reuse and Recycle initiatives to minimize waste and sustain clean environment. However, health-care facilities must evaluate carefully on the items suitable for recycling. Waste such as hypodermic needles, syringes, catheters, masks, gloves or gowns which pose any chance of cross infection risk or environmental hazards must not be recycled. Similarly, packing which is used for containment of toxic or hazardous material must not be considered for recycling and to discard appropriately according to waste guideline.

7.5.10 Training and Supervision

Training is required to ensure that all healthcare personnel know and understand the potential risks associated with healthcare waste and the procedures required for its safe management.

Healthcare waste handlers should be trained and educated on:

- a) The different types of waste and the potential hazards from such waste
- b) Safe waste-handling procedures
- c) Knowledge of first aid and medical management in the event of a sharps injury or mucous membrane exposure to blood or body fluid
- d) The process for mandatory reporting of exposure and injuries
- e) The use of PPE and competency assessment of donning and doffing of PPE
- f) When technological change occurs
- g) Update their knowledge of prevention and control measures annually

7.5.11 Recommendations

All facilities should have their own policies and procedures addressing infection prevention and control for handling of waste.

7.6 Construction and Renovation

Construction and renovation projects in health care facilities are a risk for residents, particularly those who are immunocompromised. Numerous outbreaks that occurred during construction or renovation projects have been reported. Fungi (e.g. *Aspergillus*) are the organisms most frequently associated with outbreaks. However, bacteria, in particular *Legionella* have also been associated with outbreaks during construction and renovation. A proactive approach must be taken to limit construction-related infections. This requires having a multidisciplinary team, supported by administration, to plan and implement preventive measures throughout the duration of the construction project. The IPC personnel should be an active team member in all phases of the project. The IPC personnel plays a major role by providing education to all staff ensuring that preventive measures are identified, initiated, and maintained. By ensuring that the appropriate preventive measures are in place and clear lines of communication exist among the personnel, resident safety will be enhanced.

A well-designed policy will ensure timely notification of the IPC personnel and designated committee(s) for early programme planning efforts. In addition, the policy calls for IPC personnel to evaluate the project from planning through completion and supports a systematic approach for project management.

7.6.1 *Infection Control Risk Assessment (ICRA)*

- a) Before the project gets under way, LTCFs should perform an Infection Control Risk Assessment (ICRA) to define the scope of the activity and the need for barrier measures.
- b) The ICRA and Preventive Measures Checklist is to be completed during the planning design phase of the construction/renovation project by the multidisciplinary planning committee.
- c) The IPC personnel must be involved in each phase of the project to ensure that the appropriate preventive measures are initiated and followed.
- d) The type of construction activity is first identified by selecting the level of activity that best describes the project being planned for the health care facility (Refer to Table 7.7).
- e) Next, the population and geographical risk group that may be affected by the project because of its physical proximity or exposure to the construction/renovation activity should be identified (Refer to Table 7.8).
- f) The appropriate risk category is identified by matching the construction activity with the population risk group. (Refer to Table 7.9).

- g) Infection prevention precautions are to be implemented depending on the class category (Refer to [Table 7.10](#)).

Table 7.7: Construction and Renovation Risk Assessment: Construction Activity Types

TYPE A	<ul style="list-style-type: none"> • Inspection and/or non-penetrating of walls or ceiling. It includes, but not limited to: • Removal of ceiling tiles for visual inspection limited to one tile per 5m²/50sq. ft. • Painting (but not sanding) • Wall covering, electrical trim work, minor plumbing, and activities that do not generate dust or require cutting of walls or access to ceilings other than for visual inspection.
TYPE B	<ul style="list-style-type: none"> • Small-scale and/or short-duration (≤ 8 hours) activities that create minimal dust; include, but are not limited to: • Installation of telephone and computer cabling • Replacement of ceiling boards (4 ceiling boards up to 1.5 m² for every 5 m² area) • Access to spaces for M & E services which includes behind walls or above ceiling • Cutting of walls or ceiling where dust migration can be controlled • Drilling works that generates dust
TYPE C	<ul style="list-style-type: none"> • Work that generates a moderate to high level of dust or requires demolition of any fixed building components or assemblies; include, but are not limited to: • Sanding of walls for painting or wall covering • Removal of floor-coverings, ceiling tiles, and casework • New wall construction • Minor duct work or electrical work above ceilings • Major cabling activities • Any activity which cannot be completed within a single work shift
TYPE D	<ul style="list-style-type: none"> • Major demolition and construction projects; include, but are not limited to: • Activities that require consecutive work shifts • Heavy demolition or removal of a complete cabling system • New construction

Table 7.8: Construction and Renovation Risk Assessment: Risk Groups

LOW RISK	MEDIUM RISK	HIGH RISK	HIGHEST RISK
Office areas Basement Retail outlets within LTCFs (non F&B)	Physical Therapy (Physiotherapy, Occupational therapy, Rehabilitation) Respiratory Therapy (Chest physiotherapy) Retail outlets – food related	Medical Unit (all areas with residents requiring medical treatment/care)	Any areas caring for immunocompromised residents (those with low immunity) Dialysis/Renal Unit (Kidney dialysis)

Table 7.9: Construction and Renovation Risk Assessment: Class of Precautions: Construction Project by Resident Risk

RISK GROUP	CONSTRUCTION PROJECT TYPE			
	Type A	Type B	Type C	Type D
LOW Risk Group	I	II	II	III / IV
MEDIUM Risk Group	I	II	III	IV
HIGH Risk Group	I	II	III / IV	IV
HIGHEST Risk Group	II	III / IV	III/ IV	IV

Table 7.10: Construction and Renovation Risk Assessment: Required IPC Precautions by Class

	During Construction Project	Upon Completion of Project
Class I	<ul style="list-style-type: none"> Execute work by methods to minimize raising dust from construction operations. Immediately replace a ceiling tile displaced for visual inspection. 	<ul style="list-style-type: none"> Clean work area upon completion of task.
Class II	<ul style="list-style-type: none"> Provide active means to prevent airborne dust from dispersing into atmosphere. Water mist work surfaces to control dust while cutting Seal unused doors with duct tape. Block off and seal air vents Place dust mat at entrance and exit of work area Remove or isolate heating, ventilation and air conditioning (HVAC) system in areas where work is being performed. 	<ul style="list-style-type: none"> Wipe work surfaces with disinfectant. Contain construction waste before transport in tightly covered containers. Vacuum work area with vacuums and/ or wet mop work area before leaving work area. Remove isolation of HVAC system in areas where work is being performed.

	During Construction Project	Upon Completion of Project
Class III / IV	<ul style="list-style-type: none"> Remove or isolate HVAC system in area where work is being done to prevent contamination of duct system. Complete all critical barriers (e.g. plywood, plastic) to seal area from non-work area before construction begins. Anteroom maybe required for Class IV. Maintain negative air pressure within work site. Contain construction waste before transport in tightly covered containers. Cover transport receptacles or carts. Tape covering unless solid lid. All personnel are required not to bring the dust out from the worksite by ensuring that their clothes are free from dust. 	<ul style="list-style-type: none"> Do not remove barriers from work area until completed project is inspected by the Project Manager / OSS personnel and/or IC and thoroughly cleaned by the cleaning service (by the Contractor). Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. Vacuum work area with vacuums. Wet mop area with disinfectant. Remove isolation of HVAC system in areas where work is being performed.

7.6.2 Measures Pre-construction

- a) The IPC team must be consulted to provide information on infection prevention measures and appropriate administrative/jurisdictional responsibilities delegated before construction begins.
- b) IPC personnel should be given the administrative authority to stop construction if there is a significant breach in safety measures.
- c) The project manager must identify essential services (i.e. water supply, electricity, ventilation systems) that may be disrupted and measures to compensate for the disruption, and should communicate these to the personnel responsible.
- d) IPC personnel in collaboration with nursing staff must identify resident population(s) that may be at risk and the appropriate preventive measures to ensure their safety.
- e) All personnel involved in the construction or renovation activity should be educated and trained in the infection prevention measures. For example, the infection prevention and control personnel could educate the project managers and contractors, who then ensure that the construction workers receive the appropriate education.
- f) Methods for dust containment and removal of construction debris should be outlined.
- g) Traffic patterns for construction workers should be established that avoid resident care areas.

7.6.3 Measures during Construction

- a) All windows, doors, air intake and exhaust vents should be sealed in areas of the health care facility adjacent to buildings that are going to be demolished plus areas housing residents who are most susceptible, to prevent air leaks into resident care areas.
- b) A dust barrier should be created from the floor to the true ceiling and edges sealed.
- c) An impermeable dust barrier with an anteroom must be constructed in high risk areas if the project requires consecutive work shifts to complete.
- d) Construct barriers to prevent dust from construction areas from entering resident-care areas; ensure that barriers are impermeable to fungal spores and in compliance with local fire codes.
- e) Seal off and block return air vents if rigid barriers are used for containment.
- f) Implement dust-control measures on surfaces and divert pedestrian traffic away from work zones.
- g) Monitor barriers and ensure integrity of the construction barriers; repair gaps or breaks in barrier joints.
- h) All windows, doors, vents, plumbing penetrations, electrical outlets and any other sources of potential air leak should be sealed in the construction zone.
- i) Air pressure within the construction zone should be negative compared with adjacent areas.
- j) Air in the construction zone should be exhausted directly outside. If this is not possible, then the air should be filtered through a high efficiency particulate air (HEPA) filter before being recirculated in the health care facility. The integrity of the HEPA filter should be assessed to ensure that it is not punctured.
- k) Open ends of exhaust vents should be capped to prevent air, exhausted from the construction zone, from being drawn back into resident care areas or released to outdoor streets around the health care facility.
- l) Air ducts and spaces above ceilings should be vacuumed with a HEPA filtered vacuum before the construction project is started if it involves these areas.
- m) A walk-off (sticky surface) mat should be placed outside the entrance to the construction zone to trap dust from the equipment and shoes of personnel leaving the construction zone. The mat should be cleaned daily or when visibly soiled.

7.6.4 Post-Construction Measures

- a) The construction zone should be thoroughly cleaned, including all horizontal surfaces, before the barrier is removed, and again after the barrier is removed and before residents are readmitted to the area. Time should be allowed for all dust to settle before final cleaning is carried out.
- b) IPC personnel should check the area before residents are readmitted to the finished area.
- c) Water lines should be flushed prior to use if they were disrupted.
- d) Unused cooling towers and the water supply in unoccupied portions of buildings should be disinfected before they are put in use.

7.6.5 Recommendations

- a) Establish a multidisciplinary team that includes IPC personnel to coordinate demolition, construction, and renovation projects and consider proactive preventive measures at the inception; produce and maintain summary statements of the team's activities.
- b) LTCFs should implement IPC measures as guided by the ICRA matrix before the start of construction and renovation.
- c) IPC personnel should be an active team member in all phases of the project and provide education to all staff ensuring that preventive measures are identified, initiated and maintained.

7.7 Kitchen/ Dietary Service

Food is at risk in all areas where it is stored, prepared, transported and served. Good food hygiene conditions are necessary to prevent the risk of food poisoning and to ensure food is safe and free from spoilage and is prepared and served in clean surroundings by properly trained staff. Most outbreaks of food poisoning are caused by bacteria that are given ideal conditions to grow. Factors affecting bacterial growth are:

- a) Time
- b) Temperature
- c) Food
- d) Humidity
- e) The risk of an outbreak of food poisoning occurring will be minimised if all staff involved in food handling follow the correct procedures and policies.

7.7.1 National Environment Agency (NEA) Regulatory Requirements for Food Handlers

A food handler refers to any person who handles and prepares food and beverages. Chefs, sous chefs, cooks and kitchen assistants are considered food handlers.

Waiters, dishwashers, cleaners and other service staff are generally not considered as food handlers as they are primarily not involved in the serving of food and beverage. However, they will be considered as food handlers if they are also involved in the handling and preparation. This may include washing and cutting of raw fruit, vegetable and meat, processing of ready to eat food (in raw or cooked form), preparation of sauces, spices and condiments, mixing of beverages and any other forms of food and beverage handling and preparation.

Note:

- a) All food handlers working in food establishments need to be registered with NEA.
- b) All food handlers are to undergo the training in Basic Food Hygiene –WSQ Follow Food & Beverage Safety and Hygiene Policies and Procedures.
- c) Food handlers need to attend refresher Basic Food Hygiene Course (BFHC) course every 5 years.

7.7.2 Personal Hygiene

To ensure personal hygiene, wash hands thoroughly with soap and water:

- a) before handling any food items or utensils
- b) before and after preparing food, especially raw meat, poultry and seafood
- c) before handling cooked or ready to eat food
- d) after blowing nose, sneezing or coughing
- e) after using the toilet
- f) after handling waste or touching rubbish bins

7.7.3 Sick Staff

Staff who are suffering from sickness, diarrhoea, influenza, discharges from ears, eyes, nose and septic skin conditions should not be allowed to work with food. Staff must be symptom free for 48 hours before returning to work. (Refer to chapter 2 for more details on management of sick staff). Efforts should be made to keep sick staff away from well staff, even out of working hours.

7.7.4 Good Practices when Handling Food

Personal hygiene

DO NOT do any of the following when handling or preparing food:

- a) Smoke
- b) Spit
- c) Cough or sneeze over food
- d) Pick nose
- e) Clean ears with fingers
- f) Wipe hands on a dirty cloth
- g) Comb or touch hair
- h) Wipe off perspiration with bare hands
- i) Blow into plastic bags or food wrappers to open them
- j) Taste food with fingers or with a spoon that has not been cleaned between each tasting

Food Storage

When storing food, it is important to:

- a) Store raw food separately from ready-to-eat food.
- b) Place packages of raw meat, poultry or fish in plates before refrigerating and place at the bottom shelf of the fridge so that the juices would not drip onto other food. Do not use plates that are used to hold raw meat, fish or poultry to place cooked food.
- c) Store fresh fruit and vegetable in clean plastic bags when not in use and away from raw meat or seafood products in the fridge.
- d) Keep food covered and elevated from the floor during storage and handling.
- e) Place food that are likely to spill in suitably covered trays or containers and place them in the lower part of the fridge

Food Preparation

- a) Pay attention to personal hygiene during food preparation
- b) Keep hands clean by washing hands thoroughly with soap including finger tips before, during intervals and after food preparation, changing tasks and returning from breaks
- c) It is essential that jewellery worn on hands such as rings be removed before preparation of food as they may harbour food poisoning organisms

- d) Avoid touching face, skin and hair or wiping hands on cleaning cloth
- e) Cuts should be covered with waterproof bandages
- f) Food handlers who are sick or have a skin infection or diarrhoea should not be allowed to prepare food for others. Efforts should be made to keep sick staff away from well staff, even out of working hours.

Utensils for preparing food

- a) Use different plates for raw food and cooked/ready-to-eat food. Never use the same plate without washing it thoroughly before use. Do not put raw vegetables on a plate that has previously held raw meat, poultry or seafood until it has been thoroughly washed.
- b) Use separate cutting boards and knives for cutting raw meat/seafood and for slicing cooked or ready-to-eat food. Cutting board should not be wood. Replace cutting boards that have become excessively worn out or developed hard-to-clean grooves

Washing and sanitising equipment and utensils

- a) After preparing raw food in a food processor, clean the parts of the equipment thoroughly.
- b) Keep all work surfaces clean between each task to remove all food scraps, crumbs spillage or spots that serve as potential reservoir of bacteria
- c) Discard food that has dropped on the tabletop or on the floor
- d) Regularly change, wash and sanitise cloths used for wiping tables or equipment. Never use cloths for cleaning dirty areas to clean anything that may come into contact with food.
- e) Do not recycle used food packaging and paper bags for storage of food

Cleaning Food

- a) Wash fresh fruit and vegetables thoroughly to remove soil and residue.
- b) Clean raw meat and seafood before cooking or storing to remove dirt and other contaminants.

Serving Food

- a) Always use different serving containers and serving spoons for raw and cooked food.

- b) Food are prepared and served with clean tongs, scoops, forks, spoons, spatula or other suitable implements so as to avoid manual contact of prepared foods.
- c) Use shallow containers and leave sufficient air space around the food to provide rapid and even cooling. Cooked food stored in large, deep containers remains warm for a longer time. Dangerous bacteria may grow in the warm spots which can lead to food poisoning if consumed.
- d) Do not use hands to touch the food; it must be done with a tasting spoon. Remove food with serving spoon and transfer to tasting spoon. Clean spoons must be used.
- e) Do not use crockery, utensils and appliances that are chipped broken or cracked.
- f) Never place cooked food in a container that has been used to hold raw food
- g) Cooked food intended for consumption later should be separated from food to be served as soon as it is cooked.

Storing Leftovers

- a) Refrigerate or freeze leftovers within 2 hours in clean, covered containers to prevent harmful bacteria from multiplying. When in doubt, discard leftovers
- b) Do not keep cooked food for more than 4 days. Label and date food before storing them. If there is any doubt about the safety of the food, throw it out.
- c) Cook food thoroughly, especially meat, poultry, eggs and seafood. Cook at high temperatures (above 75°C).
- d) Ensure that the centres of meat and poultry are well cooked as partially cooked food increases the risk of bacterial growth
- e) Bring food like stews, soups and curries to boiling temperatures when cooking

Temperatures for Keeping Food Safe

- a) Always keep hot food above 60°C and cold food below 5°C as bacteria multiply quickly in the temperature danger zone of between 5°C and 60°C.
- b) Have a thermometer inside the fridge and record the fridge temperature. Record to be sited or near fridge.
- c) Do not serve cooked food standing at room temperature for more than 2 hours
- d) Reheat stored cooked food at temperatures above 75°C or bring them to boil to kill the bacteria.
- e) Portion out excess cooked food immediately after cooking and refrigerate quickly
- f) Cover food properly before placing them in the refrigerator. Always store cooked and ready-to-eat food above raw food in the refrigerator to prevent cross-contamination.

- g) Keep cold food in refrigerator or on a bed of ice until it is time to serve
- h) Do not thaw food at room temperature. Defrost food overnight in the fridge or use the microwave oven. When defrosting meat in the fridge, place the meat in containers or trays to prevent the meat juices from contaminating other food.
- i) Do not leave chilled or thawed meat at room temperature for more than 2 hours as bacteria will rapidly multiply. Chilled and thawed meat should be placed in the fridge if not cooked immediately.
- j) Do not refreeze meat that has been completely thawed.
- k) Do not marinate food at room temperature on the kitchen counter. Marinate food safely in a covered bowl in the fridge.
- l) Inspect dried and preserved food regularly for insect infestations, mouldiness and other signs of spoilage. Discard where necessary.

Food Utensils

- a) Clean all utensils (including cutting boards and knives) and kitchen surfaces and countertops with detergent and hot water and dry them thoroughly.
- b) Cutting boards in particular are prone to harbouring bacteria. Use a brush to scrub off the stubborn food and dirt particles. Sanitise plastic cutting boards with chlorine or bleach solution.
- c) Use SEPARATE chopping boards, knives, tongs, spoons and other utensils for cooked and uncooked food to avoid cross contamination.
- d) Wash dishcloths and tea towels frequently and dry them thoroughly. Damp dishcloths and tea towels harbour bacteria. Frequently change tea towels or dishcloths that come into contact with plates and utensils. After using them, dry them quickly to prevent germs from breeding.
- e) Wash kitchen sponges thoroughly before putting it away. Change kitchen sponges regularly to prevent bacteria from harbouring. Kitchen sponges can harbour millions of bacteria.
- f) Clean all kitchen surfaces and countertops with detergent and hot water. Do not let food residue dry on kitchen surfaces and utensils.
- g) Keep cutting boards, utensils, cleaning cloths, sinks and countertops clean and dry to prevent accumulation of dirt and harbouring of bacteria.
- h) There is no need for separate utensils for infectious cases

Kitchen Waste

Place all kitchen waste in bags or covered bins and dispose of them frequently as kitchen wastes attracts insects and rodents which commonly carry bacteria.

Pest Control

- a) Pest-proof the premises by eliminating food sources and entry points for pests.
- b) Eliminate food sources for pests by:
 - Maintaining a clean environment
 - Clean the kitchen thoroughly at the end of the day and ensure that no food scrap/refuse is left behind
 - Clean up food/refuse spillage immediately
 - Avoid leaving food overnight uncovered
 - Keep the areas below the cooking range and sinks dry and clean
 - Carry out checks regularly for signs of cockroach infestation, rodent access and flies

Documentation for food safety

- a) The recommended documentation includes:
 - Hazard analysis
 - Staff training and health records
 - Refrigeration temperatures
 - Cleaning schedules
 - Pest control records
 - Equipment maintenance schedule

7.7.5 Recommendation

- a) LTCFs should have policies and protocols for all staff involved in food handling/dining service.
- b) All staff are responsible for their own good standards of practice and must be aware of the role they have in ensuring that food is safe.
- c) All food handlers should receive training on Food Hygiene.
- d) Food must be purchased from reliable sources, properly stored, handled and served in a safe manner.
- e) Housekeeping and Sanitation Programmes are included in all areas and equipment use for preparation and delivery of food.

7.8 Laundry

The purpose of this guideline is the prevention of infection or injury in service users and health care staff involved in the use, handling or laundering of residential and non-residential care facilities linen. This guideline, which should be applied to all laundry facilities including commercial laundry and on-site laundry, operated by residential and non-residential care facilities.

7.8.1 *Facility Design*

The laundry area must be sited such that used or infected/soiled laundry is not carried through areas where food is stored, prepared, cooked or eaten. The laundry area should have designated “dirty” and “clean” zones – a “dirty” zone for receiving and handling soiled laundry and a “clean” zone for processing the washed laundry. The laundry area design must facilitate the workflow from ‘dirty to clean’ zone. Clean zone is for folding, ironing and storage of the washed laundry. The laundry floor and wall must be of easily cleanable material. The floor should be non-slip.

7.8.2 *Hand Wash Basin*

Non-hand touch taps are recommended. Liquid soap and paper towels must be available. A foot-pedal operated bin for paper towels should be provided.

7.8.3 *Washing Machines/Equipment*

- a) Washing machines with a sluice cycle are recommended. Pre-wash soaking with bleach/disinfectants is discouraged to prevent occupational exposure.
- b) Washing machines must be regularly maintained and records retained for a period of 24 months or per organisation policy. Servicing of equipment should be performed to manufacturers’ recommendations. Temperature gauges should be regularly checked and calibrated.
- c) Volumes, concentrations and expiry dates of disinfectants used should be monitored and recorded daily.
- d) Washing powder/liquid must be kept in a locked storage cupboard.
- e) Washing machines must not be over loaded to ensure that the machine functions adequately.
- f) Laundry bags, containers should be cleaned with detergent and water after each use for soiled or infected linen, or at least weekly for routine use.

7.8.4 Staff

- a) The laundry/operations supervisor and staff should have appropriate training on potential infectious hazards and techniques in handling used and soiled linen.
- b) Laundry staff should always wear gloves and a disposable apron whilst handling used and soiled laundry.
- c) Hands must be washed after removal of gloves and apron.

7.8.5 Linen Handling

Clean linen

There must not be contact between clean and soiled linen at the laundry area. Clean linen awaiting delivery to the ward/care area should be stored in the clean and dry zone. Clean linen in the ward/care area should be stored in a designated clean and dry location. The clean linen should not be stored in bathroom, sluice room or dirty utility room.

Used linen

Used linen should not be sorted. Used linen are to be contained in a white (or designated colour) plastic bag. Bed linen should not be shaken and must be removed with care to avoid dispersing dust and contaminants. Used linen or clothing should not be placed on the floor or any clean surface; these items should be placed directly into a designated laundry/plastic bag. Laundry/plastic bag must be strong enough to contain the linen. Bags must not be over-filled and should be securely tied. No extraneous items should be placed in the laundry bags, especially sharp objects. This may contribute to a health and safety risk for the laundry workers.

Infected linen

Infected or soiled linen should not be sorted or agitated. Infected or soiled linen with urine or faeces, vomit, sputum is to be washed off into the WC or slop-hopper and excess water drained before putting them into the designated plastic bag which will be sent to the laundry. Note: A dedicated sink or toilet bowl can be used to wash off contaminated or soiled linen if a slop-hopper is not available. Items that are not washable should be dry cleaned or destroyed if necessary. Double-bagged laundry should be handled carefully to reduce the risk of fluid contamination when placing the contaminated linen into the machine.

7.8.6 Linen Transport

Soiled/contaminated linen and clean linen should be transported in different designated trolleys, bins, or bags. Double impermeable bags containing soiled/infected linen

should be handled carefully to avoid damage and the release of possible contaminated aerosols into the air. Soiled/infected linen when unloaded in the laundry area should be placed away from the cleaned linen zone.

7.8.7 Laundry Process

Linen should be sorted for washing by laundry staff wearing gloves and aprons. Masks are not required but any lesion on hands must be covered. Laundry staff should receive instruction in proper use of personal protective equipment and hand hygiene.

There must be a workflow which includes physical separation of dirty linen from that which has already been cleaned.

7.8.8 Wash Protocol

Heat stable linen

Linen should be washed according to minimum requirements as outlined in international guidelines. Temperature and time requirements must include time for mixing and penetration into large loads. Temperature must achieve $>65^{\circ}\text{C}$ for at least 10 minutes, minimum cycle time 14 minutes for low loading or 18 minutes for high loading; or preferably 71°C for at least 3 minutes, minimum cycle time 7 minutes for low loading or 11 minutes for high loading.

Infected linen

Requirements outlined above will eliminate most infectious agents with the exception of spore forming organisms. If removal of spore forming organisms is necessary, chemical disinfection with sodium hypochlorite to achieve a free chlorine concentration of $>180\text{ppm}$ in the second rinse is recommended.

If linen is heavily soiled, a sluice cycle should be used before the disinfectant cycle.

Heat labile linen

Heat labile fabrics should be processed separately using chemical disinfection (e.g. sodium hypochlorite at $>150\text{ppm}$ free chlorine) at low temperature. No recommendation is made regarding disinfecting agents for usual laundry requirements.

7.8.9 Drying

Workflow must ensure separation of washed from unwashed linen. Handling of washed linen should prevent re-contamination

7.8.10 Personal Health and Safety

The facility appoints a person to be in-charge of the on-site laundry service. The person's principle responsibilities are as follows:

- a) To ensure that the laundry machine is fit for use from an infection prevention and control perspective
- b) To keep records relating to the laundry machines
- c) To ensure that the laundry machine is scheduled for maintenance per manufacturer's recommendation

7.8.11 Recommendations

- a) Residential and non-residential care facilities should have policies and protocols to prevent the risk of infection in linen storage and distribution; and for staff to understand the correct process on the use of clean linen, handling and storage of used and infected linen for transport to external or on-site laundry facilities.
- b) All staff are responsible for their own standards of practice and must be aware of the role they have in the management of clean, used and infected linen. They have a duty to report issues in relation to linen management to their Supervisor
- c) Facility management should be responsible to provide training for staff, and the mandatory topics are:
 - Infection prevention and control
 - Use of appropriate PPE
 - Moving and handling clean, used and infected linen

7.9 References

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7.10 Appendix 7

Types of Chemical Disinfectants

Alcohol

Alcohols are rapidly bactericidal rather than bacteriostatic against vegetative forms of bacteria. They are also tuberculocidal, fungicidal and virucidal (enveloped viruses; alcohol has poor activity against some non-enveloped viruses such as parvovirus) but do not destroy bacterial spores. Their cidal activity drops sharply when diluted below 50% concentration and the optimum bactericidal concentration is in the range of 60-90% solutions in water (volume/volume).

Alcohols are not recommended for sterilising medical and surgical materials principally because of their lack of sporicidal action and their inability to penetrate protein-rich materials. Alcohols effectively disinfect oral and rectal thermometers, scissors, cardio-pulmonary manikins, external surfaces of equipment and stethoscopes. Alcohol towelettes have been used for years to disinfect small surfaces such as rubber stoppers of multiple dose medication vials or vaccine bottles.

Alcohol is flammable and consequently must be stored in a cool, well-ventilated area. It can also be stored in a flammable cabinet. They evaporate rapidly and this makes extended exposure time difficult to achieve unless the items are immersed.

Chlorine and Chlorine Compounds

Hypochlorites are the most widely used of the chlorine disinfectants and are available in a liquid (e.g. sodium hypochlorite) or solid (e.g. calcium hypochlorite) form. The most prevalent chlorine products are aqueous solution of 5.25% to 6.15% sodium chloride, which usually are called household bleach. They have a broad spectrum of antimicrobial activity, do not leave toxic residues, are unaffected by water hardness, inexpensive and fast acting, remove dried or fixed organisms and biofilms from surfaces, and have a low incidence of serious toxicity.

Disadvantages of hypochlorites include corrosiveness to metals in high concentrations (>500 ppm), inactivation by organic matter, discolouring or “bleaching” of fabrics, release of toxic chlorine gas when mixed with ammonia or acid (e.g. household cleaning agents) and relative stability.

Hypochlorites are widely used in healthcare facilities in a variety of settings. Inorganic chlorine solution is used for spot disinfection of counter tops and floors. A 1:10 to 1:100 dilution of 5.25% - 6.15% Sodium hypochlorite (i.e. household bleach. For small spills of blood (i.e. drops of blood) on noncritical surfaces, the area is to be flooded with 1:100 dilution of 5.25%-6.15% sodium hypochlorite. Disinfection with a 1:10 dilution of concentrated sodium hypochlorite (e.g. bleach) has been shown to be effective in reducing environmental contamination in resident rooms and in reducing *C. difficile* infection rates or in an outbreak setting.

Sodium Dichloroisocyanurate (NaDCC) is a broad-spectrum anti-microbial agent which is effective against bacteria (including MRSA, *E. coli* and *Pseudomonas*), fungi, viruses (including HIV and Hepatitis). It is more stable and therefore more effective than liquid forms of Sodium Hypochlorite. Tablets have a longer shelf life, are convenient to use and correctly prepared give an accurate strength. Once made, preparations will lose their activity over time, therefore all solutions must be discarded after 24 hours.

Glutaraldehyde

Glutaraldehyde is a saturated dialdehyde that has gained wide acceptance as a high level disinfectant and chemical sterilant. Aqueous solutions of glutaraldehyde are acidic and generally in this state are not sporicidal. Only when the solution is activated (made alkaline) does the solution become sporicidal. Once activated, the solution has a shelf life of 14 days. The antimicrobial activity is dependent on conditions such as dilution and organic stress.

Glutaraldehyde is used most commonly as a high-level disinfectant for medical equipment such as endoscopes, dialysers, laparoscopic disposable plastic trocars. Glutaraldehyde is noncorrosive to metal and does not damage lensed instruments, rubber, or plastics. It should not be used for cleaning non critical surfaces as it is too toxic and expensive. Glutaraldehyde exposure should be monitored to ensure a safe work environment. In the absence of an OSHA permissible exposure, if the glutaraldehyde level is higher than the American Conference of industrial Hygienists ceiling limit of 0.005 ppm it would be prudent to take corrective action and repeat monitoring.

Hydrogen Peroxide

Hydrogen peroxide is delivered by a computer-controlled distribution system that ensures even distribution throughout the room while monitoring gas concentration, temperature and relative humidity. These may come in the form of aerosolized (35% hydrogen peroxide) or mist (5% hydrogen peroxide).

The advantages of using hydrogen peroxide are:

- a) It is relatively safe and decomposes to water and oxygen. Once decontamination is completed, an aeration unit in the room converts the hydrogen peroxide into water and oxygen. The time required for the mist decontamination is dependent on room volume and technology used.
- b) It is effective for decontaminating complex furniture and equipment that is difficult to clean manually.
- c) It may be used to decontaminate entire units/wards during outbreaks.
- d) It is effective against a wide range of microorganisms, including bacteria, viruses and spores, particularly *C. difficile*.

The disadvantages of using hydrogen peroxide are:

- a) Time taken to complete decontamination process.
- b) Biological soiling reduces the efficacy of vaporized hydrogen peroxide.
- c) Air ducts from the room must be sealed prior to decontamination.
- d) Additional cost

Iodophors

Iodine solutions or tinctures have been used primarily as antiseptics on skin or tissue. Iodophors have been used both as antiseptics and disinfectants. Povidone iodine is the most commonly used iodophor. They retain germicidal efficacy of iodine but unlike iodine are generally non-staining and are relatively free of toxicity and irritancy.

Besides their use as an antiseptic, iodophors have been used for the disinfection of blood culture bottles and medical equipment. Antiseptics are not suitable for use as hard surface disinfectants because of concentration differences. Iodine or iodine-based antiseptics should not be used on silicone catheters as the silicone tubing may be adversely affected.

Ortho-phthalaldehyde (OPA)

OPA is a high-level disinfectant. It contains at least 0.55% OPA. OPA solution is a clear, pale-blue liquid with a pH of 7. Studies have demonstrated excellent microbiocidal activity in in-vitro studies including superior mycobactericidal activity. OPA has several potential advantages compared to glutaraldehyde. It has excellent stability over a wide pH range (pH 3-9), is not an irritant to the eyes and nasal passages, does not require exposure

monitoring, has a barely perceptible odour and requires no activation. It has excellent material compatibility. A potential disadvantage is that it stains protein grey (including unprotected skin) and thus must be handled carefully. Equipment must be thoroughly rinsed to prevent discoloration of a resident's skin or mucous membrane. The minimum effective concentration of OPA is 0.3% and concentration is monitored by test strips.

Peracetic Acid

Peracetic acid is characterized by a very rapid action against all microorganisms. Special advantages of peracetic acid are its lack of harmful decomposition products. It enhances removal of organic material and leaves no residue. It remains effective in the presence of organic material. Peracetic acid will inactivate Gram-positive and Gram-negative bacteria, fungi and yeasts in less than 5 minutes at less than 100 ppm. In the presence of organic matter, 200 to 500 ppm is required. For virus the range is wide (12-2250 ppm). Although this product is rapidly effective against a broad range of microorganisms, it tarnishes the metal of endoscopes and is unstable, resulting in only a 24-hour use life.

Quaternary Ammonium Compounds

The quaternary ammonium compounds are widely used as surface disinfectants. Gram negative bacteria have been found to survive or grow in them. Results from manufacturers' data sheets and from published scientific literature indicate that the quaternaries sold as hospital disinfectants are fungicidal, bactericidal, and virucidal against lipophilic (enveloped) viruses. They are not sporicidal and generally not tuberculocidal or virucidal against hydrophilic (non-enveloped) viruses. Best et al and Rutala et al. demonstrated the poor mycobactericidal activities of quaternary ammonium compounds.

The quaternaries are commonly used in ordinary environmental sanitation of non-critical surfaces such as floors, furniture, and walls. Quaternary ammonium compounds are appropriate for disinfecting medical equipment that comes into contact with intact skin (e.g. blood pressure cuffs).

CHAPTER 8 RESIDENTS INFECTED WITH OR COLONISED BY MDROS

Multi-drug resistant organisms (MDRO) are microorganisms that are resistant to one or more classes of antimicrobial agents. Although the name of the organism may suggest resistance to only one antibiotic (e.g. MRSA or VRE), they are often resistant to multiple classes. MDROs in Singapore typically include methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* (VRE), and carbapenemase producing carbapenem resistant *Enterobacteriace* (CP-CRE).

Residents of LTCFs are frequently colonized (>20% based on local data 2012) with multidrug-resistant organisms. Fortunately, however, these uncommonly evolve into a clinical infection. Hospitalised patients have a different risk of infection because of intravenous lines, surgical wounds etc. and as such an aggressive approach to active surveillance and segregation is justifiable in that acute setting. In LTCFs, active surveillance and consistent segregation is not practical and as such prevention of MDRO transmission needs to rely on the so called horizontal measures including hand hygiene and environmental cleaning, afforded by standard precautions.

For some years, Singapore's LTCFs have been reluctant to accept transfers of residents with MDROs leaving the acute setting and identified as MDRO colonised (or infected), even when they began their acute admission as MDRO colonised from the LTCF. A study in 2013 identified that 40% of LTCF transfers to the acute setting had MRSA. Considering this it is not reasonable to deny admission or segregate MDRO colonised residents in the absence of an aggressive and impractical active surveillance programme.

We recommend that residents identified as colonised by an MDRO be treated no differently from non-colonised residents by LTCFs.

8.1 Role of Antimicrobial Management in Healthcare Facilities

Appropriate use of antimicrobials plays a major role in preventing the selection of antimicrobial resistance in bacteria. LTCFs should develop and maintain an antibiotic guideline for prophylaxis and empiric treatment of infections commonly found in that facility. Acceptance by doctors practising there and a system of monitoring of compliance is required.

Such an audit and feedback programme would constitute an antimicrobial stewardship programme (ASP).

8.2 IPC Programme and Risk Assessment

An effective and comprehensive IPC programme in LTCFs is essential to control MDRO transmission. Ideally it should incorporate the following:

- a) A set of policies aligned to the core components of an IPC programme
- b) Monitoring of infection prevention and control processes
- c) Education of employees in IPC practises
- d) Processes for development and updating of IPC policies and procedures
- e) Access to microbiology or laboratory services
- f) Policies for management of antimicrobial use in the healthcare institution

It is best to perform a risk assessment annually, whereby rates of clinical infections and implementation of IPC interventions can be considered, including the components above.

From the MDRO surveillance and risk assessment, the facility should develop and implement an appropriate IPC programme that targets transmission of all potential pathogens in the facility.

This requires each institution to have the following IPC components:

- a) IPC staffing and/or hours assigned to IPC
- b) Knowledge of IPC interventions in place (e.g. Hand hygiene programme, environmental cleaning, etc.)
- c) Status of IPC interventions e.g. measurement parameters and compliance rates
- d) Facility antibiogram

8.3 Infection Prevention and Control Measures for MDRO in LTCFs

Contact precautions are impractical and not effective in preventing transmission of MDROs in nursing homes. This is because of the nursing homes' unique context:

- Isolation/cohorting and deprivation from communal activities is detrimental to the residents' psychosocial health. These residents are ambulant and are free to participate in communal activities within and outside the nursing home. Therefore, current isolation/cohorting efforts which have been limited to sleep arrangements would not be effective in preventing transmission;

- There is no regular and routine active surveillance of MDROs in nursing homes to track acquisition and clearance, which is necessary to accurately determine which have MDRO carriage; however, it is impractical to impose such surveillance in the nursing home setting. As such, contact precautions in nursing homes is based on patients having a history of MDRO carriage, which is unreliable and provides a false sense of security;

It is therefore more effective to strengthen the overall infection prevention programme, practise good standard precautions for all patients to prevent transmission, and educate residents, caregivers and visitors. This is similar to the approach of universal prevention adopted in blood-borne conditions, where we treat all patients as potentially infectious.

Due to differing risk, appropriate IPC guidance differs according to the setting or type of healthcare facility. For example, the isolation of a resident in acute care facilities differs from that for nursing homes because there are more risks in the acute setting e.g. greater use of devices, invasive procedures. For residents in nursing homes, the nursing home is generally their long-term residence, and isolation for asymptomatic residents who are colonised with MDRO(s) is not indicated.

Alternatively, residents with MDROs may be cared for in social homes e.g. homes run by the Ministry of Social and Family Development (MSF).

8.3.1 MDRO-Colonised Residents in Residential LTCFs

Residents colonised with an MDRO do not pose a risk to healthy members of the community (including family members). However, all healthcare facilities should endeavour to prevent transmission of MDROs.

Generally, Standard Precautions should be implemented when dealing with all residents in all healthcare facilities regardless of whether they are infected or colonised with an MDRO, viz.

- a) Hand hygiene should be performed
- b) Standard precautions are the mainstay of IPC for all residents (see Chapter 3)
- c) Any PPE is only required where this a risk of contact with blood or body secretions

8.3.2 Relatively Healthy Independent Residents Colonised with a MDRO

Standard Precautions are adequate, with emphasis on ensuring that gloves and aprons are used when dealing with secretions, draining wounds, stool, ostomy bags or tubes and pressure ulcers.

8.3.3 *Dependent Residents OR those with Uncontrolled Secretions OR Suffering from an Infection with a MDRO*

Likewise, Standard Precautions are recommended in this situation, which includes PPE only where exposure to secretions is possible. Isolation or cohorting which may be practised in the acute setting is not essential in LTCFs owing to a lower vulnerability of fellow residents. Furthermore, given the degree of socialisation in general, isolating individuals is unlikely to affect overall LTCF prevalence.

For the nursing home setting, the implementation of IPC Precautions practised in an acute care setting may have adverse psychological consequences for the resident, where the facility is also their home.

8.3.4 *MDRO-Colonised Clients in Non-Residential LTCFs and Other Ambulatory Care Settings*

Although the risk of MDRO transmission is less in non-residential LTCFs and day care settings, these facilities should also be aware of the risk of clients with MDROs and undertake routine measures to prevent spread.

Basic IPC measures are to be implemented e.g. facilitating hand hygiene and environmental cleaning.

Segregation of clients known to be MDRO colonised from others cannot be justified in the absence of an aggressive active surveillance programme which is not appropriate. Standard precautions together with precautions including frequent hand hygiene and cleaning of all and surfaces used immediately between residents should be a routine practice.

8.3.5 *MDRO-Colonised Persons in Social Homes*

As with the above settings, it is not necessary to distinguish care based on whether an individual is MDRO colonised. Standard Precautions including hand hygiene should be implemented. Single-use person care equipment should be used where possible. Other equipment should be dedicated and remain in the resident's room until they are discharged from the home-care service. Where equipment cannot be left in the resident's room (e.g. stethoscopes) or not designated as single person use, they should be cleaned and disinfected using a low to intermediate level disinfectant before leaving the resident's room.

8.4 Methicillin Resistant *Staphylococcus aureus* (MRSA)

The term is used to describe a number of strains of the bacterium *Staphylococcus aureus* that have developed resistance to antibiotics typically used in treatment. MRSA is an opportunistic bacterium, which may colonise and grow readily on the skin and mucous membranes of a person, without harm to that person. It is commonly isolated from warm, moist body sites such as the nose, groin and perineum. MRSA colonisation can lead to infection such as in the skin.

8.4.1 Surveillance for MRSA in Residential LTCFs

Although undertaken in the acute setting this is not recommended in LTCFs unless part of a specific project. While transmission will occur in the non-acute setting, the risk of infection is low. Active surveillance is not practical on a regular and sustained basis.

8.4.2 Management of MRSA Residents in LTCFs

None should be declined admission to an LTCF because of MRSA colonisation. Routine IPC protocols should be in place to control the spread of all organisms between all residents in LTCFs. Singling out an individual because of identified colonisation is not justified when the evidence is that there are many unidentified residents and no active surveillance to identify them in the LTCF. For the same reason decolonisation therapy is not indicated.

8.5 Vancomycin Resistant Enterococcus (VRE)

The method of MDRO control is standard precautions and a strong programme of IPC standards (focusing on Hand Hygiene and environmental cleaning). Identified carriers of MDROs can be managed the same as other residents. None should be declined admission to an LTCF because of VRE colonisation and segregation is not required.

8.6 Carbapenemase-Producing Carbapenem Resistant *Enterobacteriaceae* (CP-CRE)

Enterobacteriaceae is a term used to describe groups of Gram-negative bacilli that commonly live in the bowel. It includes organisms such as *Escherichia coli*, *Klebsiella pneumoniae*, *Enterobacter cloacae* and *Citrobacter freundii*. B lactam antimicrobials comprise some of the most commonly used agents, such as penicillins, cephalosporins, monobactams and carbapenems. The production of β -lactamases by *Enterobacteriaceae* is a key mechanism for the development of resistance to the various types of β -lactam antimicrobials.

None should be declined admission to a LTCF because of CP-CRE colonisation. The concept of MDRO control in LTCFs is standard precautions and a strong programme of IPC standards (focusing on hand hygiene and environmental cleaning). Identified carriers of MDROs can be managed the same as other residents. No one should be declined admission to an LTCF because of CP-CRE colonisation and segregation is not required.

Use Standard Precautions for all residents (irrespective of MDRO colonisation) who have draining wounds or faecal or urinary incontinence or uncontrolled secretions.

8.7 Cleaning and Decontamination of Environment and Equipment used for MDRO Carriers

Policies related to cleaning should be based on the assumption that any resident could be a MDRO carrier. As such it is not recommended to have differing approaches based on whether an individual is known to be colonised.

Therefore, as mentioned in previous chapters the principles include; policies for environmental cleaning and equipment decontamination, waste and linen management standards, and an assurance that the policies are well implemented. Wards should be cleaned regularly as part of a general programme of environmental hygiene

In addition:

- a) Adequate hand hygiene facilities and alcohol-based handrub should be available for staff and visitor hand decontamination before and after contact with the resident or their immediate environment
- b) Instruments or equipment should preferably be single-resident use
- c) Multiple-resident-use items should be decontaminated appropriately before use on another resident in accordance with local policy or manufacturer's instructions
- d) All resident care equipment or supplies must be effectively cleaned and disinfected before use on another resident
- e) Documents including the nursing notes and resident chart should not be taken to the bedside.

8.8 Antiseptic Body Wash or Wipes

There is no evidence for the routine use of antiseptic body washes in LTCFs e.g. 4% chlorhexidine, liquid chlorhexidine (2%) or 2% chlorhexidine-impregnated wipes, octenidine or equivalent products. Likewise, decolonisation therapy is not indicated routinely in LTCFs nor

prior to transfer. The only current evidence for benefit of routine daily antiseptic bathing is in Intensive Care Units. Chlorhexidine, if used, is usually not used above the jaw line or on open wounds.

In long-term care settings this type of an intervention might be used on targeted high-risk residents as advised by a specialist in IPC.

8.9 Linen

All linen should be treated the same whether or not it is from a resident known to be colonised by an MDRO. Linen should be removed from the bed with minimal agitation and the processes need to be adequately implemented to ensure adherence as outlined in Chapter 8.

8.10 Re-usable Bedpans and Urinals

Dedicated bedpans or urinals are not required. Ensure that the bedpan washer or disinfectant is in good working order.

8.11 Crockery and Cutlery

No special precautions are necessary with these items

8.12 Transfer from the LTCF

- a) When a resident with an MDRO is transferred to another healthcare facility, the referring LTCF should inform the receiving institution of the MDRO status if it is known.
- b) As the resident is not normally in direct contact with surrounding environmental surfaces or the staff members clothing during transportation, aprons or gloves are not required unless directed by Standard Precautions.

8.13 Ambulance Transportation

- a) Ambulance staff should adhere to Standard Precautions with all residents irrespective of their known MDRO status.
- b) To minimise the risk of cross infection with any infectious agent, ambulance staff should use an alcohol based hand gel or rub after contact with all residents as part of standard precautions.
- c) The resident may travel with other residents unless notified to the contrary.
- d) Unnecessary equipment and linen should be removed before transporting.

- e) Residents on stretchers should be placed and wrapped in a clean sheet before leaving the ward.
- f) Local areas of resident contact e.g. chair and stretcher should be cleaned and disinfected as per local decontamination policy.
- g) After resident contact, the gown/apron and gloves should be removed and hands decontaminated using an alcohol-based hand rub if visibly clean hands or antiseptic hand wash, if necessary. Fumigation and prolonged airing of the ambulance is not necessary.

8.14 Deceased Resident

Plastic body bags are not necessary, but may be used as part of general practice in accordance with standard precautions for all residents.

8.15 Recommendations

- a) Each LTCF should have a written policy describing how the guidelines in this chapter are to be met.
- b) Routine and regular active surveillance for MDROs is not practical in LTCFs and as such any resident can be regarded as colonised. There should be no distinction between residents known to be colonised and residents not recently tested.
- c) No one should be declined admission to a LTCF because of MDRO colonisation. Once admitted; isolation, cohorting or social segregation is not recommended.
- d) The emphasis for transmission prevention is on effective Standard Precautions.
- e) Contact Precautions are recommended for all dependent residents with uncontrolled secretions.

8.16 References

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CHAPTER 9 IPC AND CLINICAL MANAGEMENT OF SPECIFIC INFECTIOUS DISEASES

Residents, HCWs, and visitors with infectious disease create a risk of transmission to susceptible residents and HCWs in LTCFs. Transmission risk increases when there are delays in the diagnosis or implementation of control measures.

Outbreaks can be prevented by the appropriate IPC management of such infections e.g. VZV, scabies, measles, TB. It is reasonable to discuss any of the below conditions with acute hospital specialists or MOH in order to prevent an outbreak. (See chapter 5 on surveillance and outbreak management)

Table 9.1: Management of residents with Infectious Diseases

S/N	Infectious disease	Incubation period	Route of transmission	Infectious period	IPC measures	When to de-isolate
1	Chickenpox or disseminated Herpes zoster	10 - 21 days	Airborne	2 days before rash until all sores have crusted (6 - 7days)	Transfer to negative pressure room at acute hospital. While awaiting transfer keep in single room (Staff should wear N95 respirator) ¹ . Single dermatome HZV can be covered and kept at LTCF.	After all visible lesions crusted over
2	Measles	8 -12 days		4 days before rash until 4 days after rash appears		4 days after rash appears
3	Tuberculosis - pulmonary or laryngeal	Variable		Until 2 weeks on drugs		If on treatment >2 weeks, and cleared by specialist
44	Influenza (proven or strong clinical suspicion)	1-2 days	Droplet	Onset of symptoms until fever gone	Single room (normal pressure) or segregation in a cordoned area > 2 meters from other beds. Surgical mask / (+/- gloves, gown)	7 days after onset of symptoms or 24 hours after the resolution of symptoms
5	Confirmed <i>Clostridium</i>	2 - 3 days	Contact	Contagious until stools are formed	Single room or cordoned area	48 hours after

¹ In the exceptional circumstances where the resident can be kept safely in a single room with open windows without passing foot traffic, LTCFs can consider to manage such cases within their facilities.

S/N	Infectious disease	Incubation period	Route of transmission	Infectious period	IPC measures	When to de-isolate
	<i>difficile</i> infection				/cohorting bay - gloves+/- gown	diarrhoea resolution
6	Norovirus or Rotavirus infection	1-2 days		Contagious until resolution		
7	Scabies	30 - 45 days		Onset of rash until 1 treatment	Treatment is the most important measure. Outbreak investigation and treat others as indicated.	24 hours after treatment given.